VOL. XXXI. No. 12 DECEMBER 1946

MECCANO MAGAZINE

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6D.

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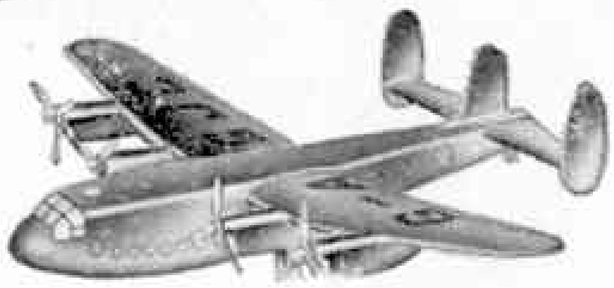

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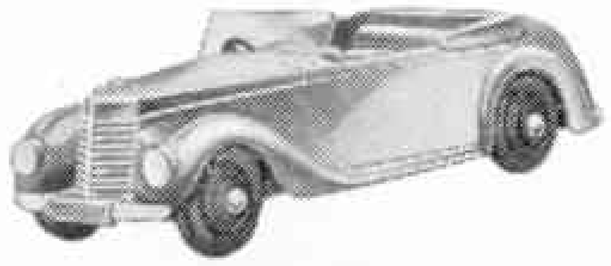

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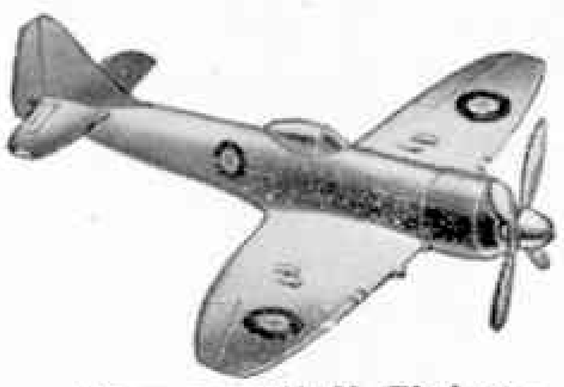

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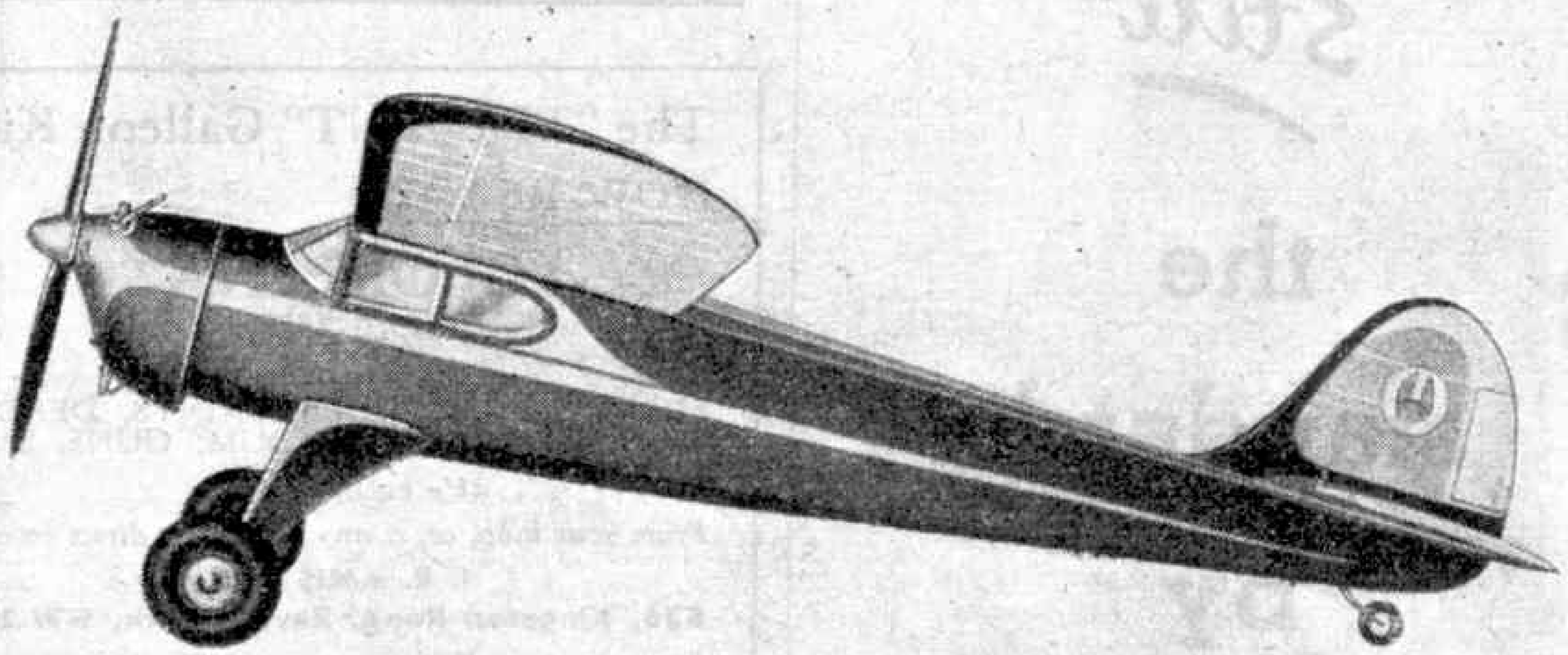

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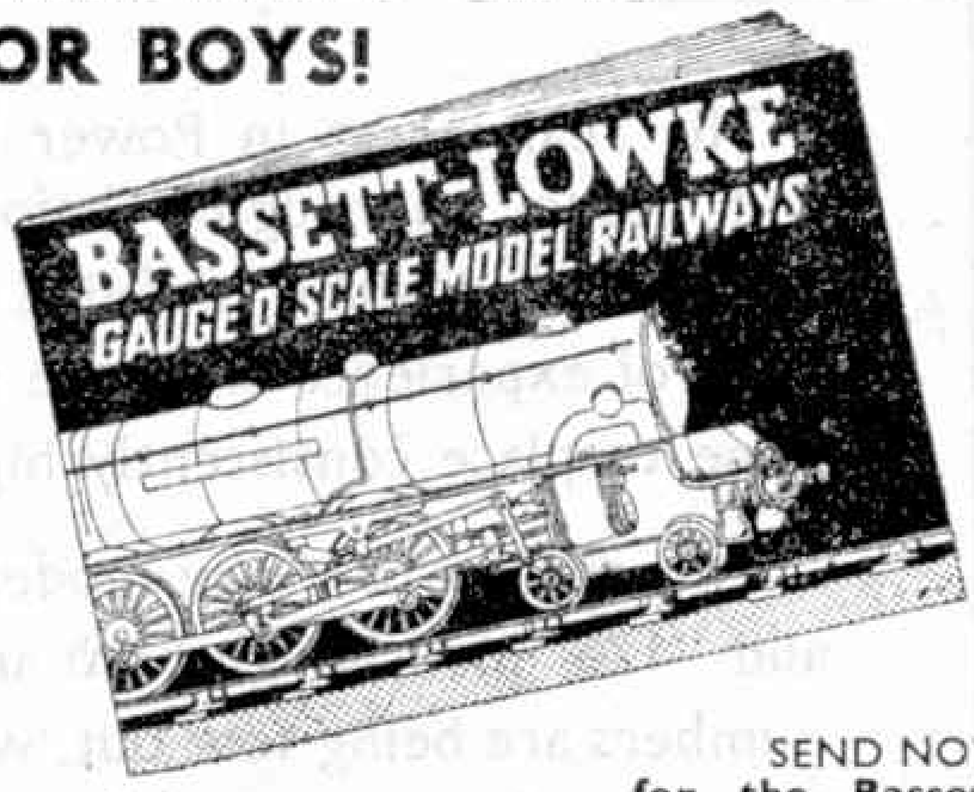

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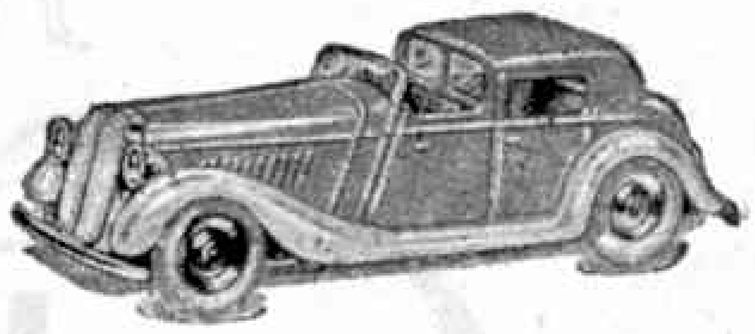
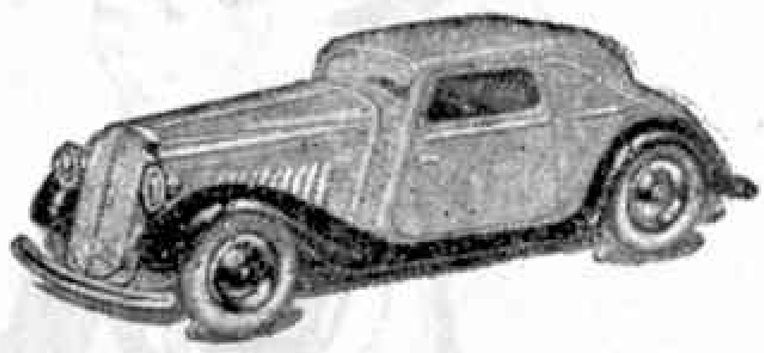
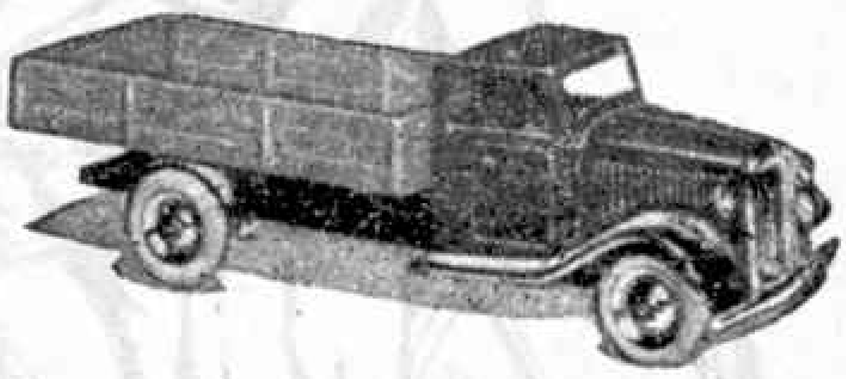


MINIC Vauxhall Town Coupé. Length 5".



MINIC Vauxhall Cabriolet. Length 5".



MINIC Delivery Lorry. Length 5½".

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MECCANO MAGAZINE

Editorial Office:
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Vol. XXXI
No. 12
December 1946

With the Editor

Future of Steam Locomotives

The announcement of a further extension of Southern Railway electrification is another blow at our old friend the steam locomotive. It looks as though steam will be banished from the whole of the railways of south eastern England, for subsidiary and feeder services are to be handled by diesel locomotives. This follows the announcement by the G.W.R. that they are going to experiment with gas turbine propulsion.

All this is apt to be depressing to the steam enthusiast. It is therefore cheering to note that such an experienced locomotive engineer as Mr. Bulleid of the S.R. has not lost faith in steam. In his recent presidential address to the Institution of Mechanical Engineers he called for a general purpose engine capable of running over most of its company's routes. It should be able to take a 480-ton passenger train at 90 m.p.h. or a 1,200-ton goods or mineral train at lower speeds. It should incorporate a new high-pressure boiler free from stay and tube troubles. The feed water should be treated by equipment on the engine itself and heated by exhaust steam. All moving parts should be enclosed and continuously lubricated. It should be capable of running in either direction equally well, with unobstructed lookout for the enginemen, and it should be able to run 100,000 miles between overhauls with the minimum of shed attention.

A design to fill these exacting requirements has actually been prepared for the S.R. and five such engines have been ordered. These engines will have a new type of boiler and two six-wheeled power bogies, the centre axle of each being driven by a three-cylinder simple expansion engine. The locomotives will have a cab at each end and their general appearance will probably suggest electric rather than steam practice.

Our Plastics Articles

This month's cover shows a long line of 150-ton semi-automatic plastics presses at the Elo Works of Birkbys Ltd., Liversedge, Yorks., and on page 502 appears the final article of our series "*Plastics in Everyday Life.*" The object of this series has been to give a general account of plastics—what they are, how they are made, and for what purposes they are used. I shall be glad to hear from readers who would like more information on any special point.

The applications of plastics, already very extensive, are rapidly increasing, and in later articles some of the most interesting of these will be described and illustrated.

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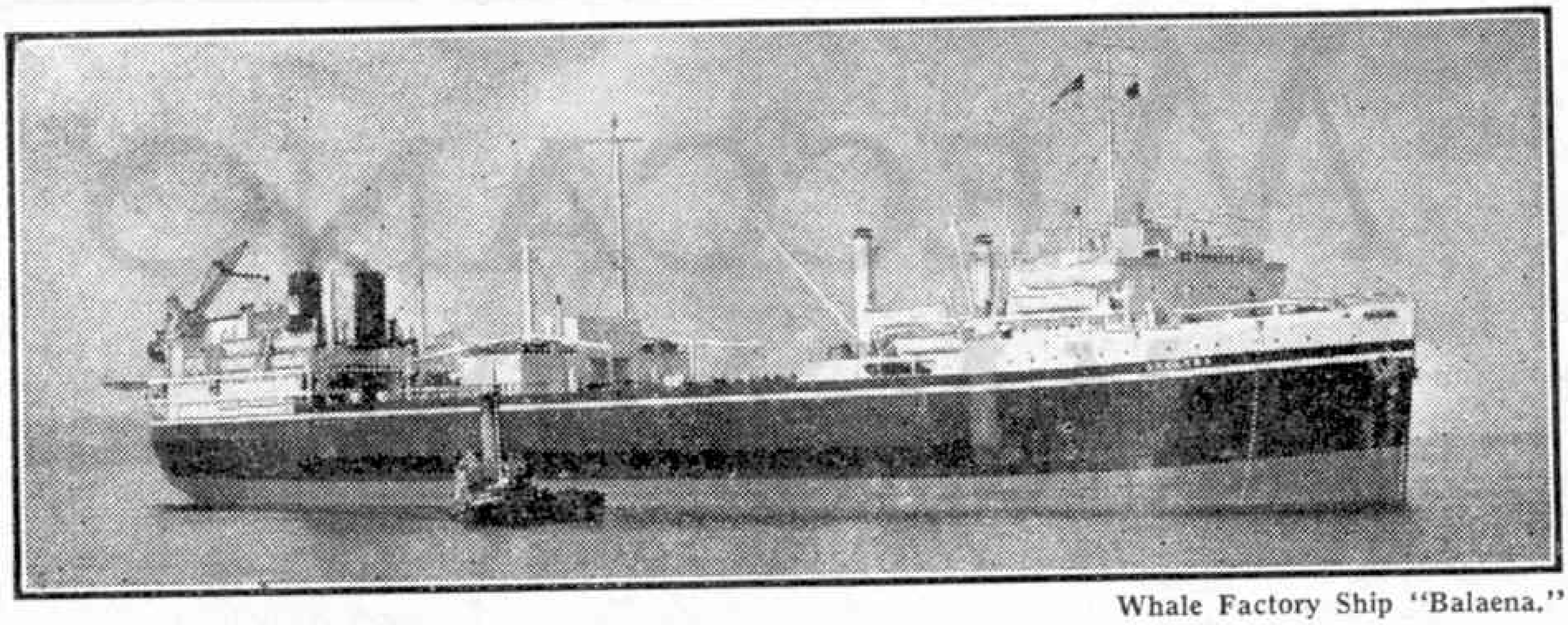


Whale Factory Ship "Balaena."

A Modern Whale Factory Ship

By Denis Rebbeck, M.A., B.Litt., M.Inst.N.A., M.I.Mar.E.

THE whale factory ship *"Balaena,"* which recently completed sea trials, has been handed over to her owners, United Whalers Limited, in time to take part in this year's Antarctic whaling season. Probably no merchant ship of recent years has evoked such widespread interest and the many innovations which have been embodied in her design and equipment are a striking tribute to the close co-operation between United Whalers Limited and Harland and Wolff Limited, Belfast.

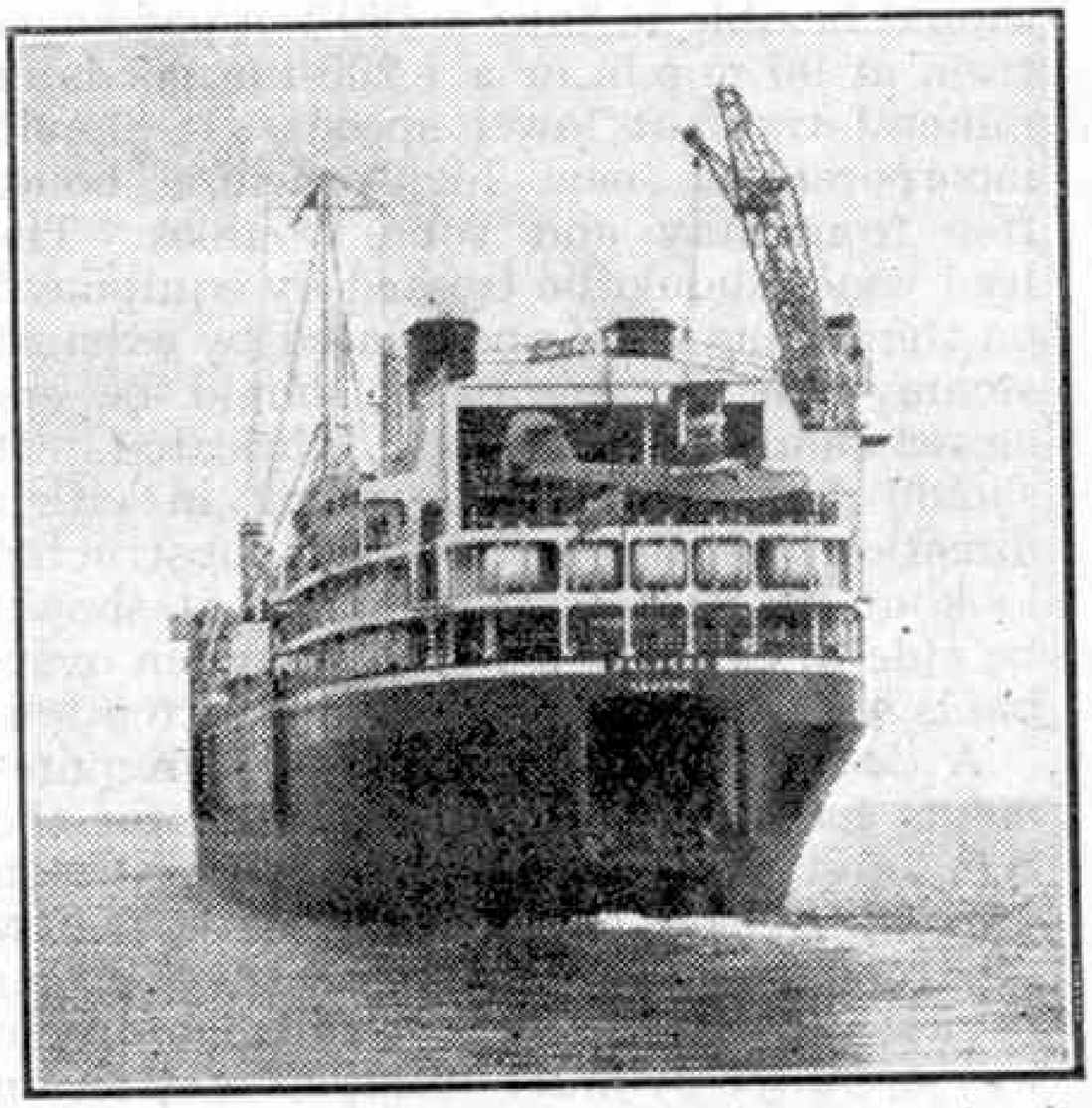
The *"Balaena"* is unique in the fact that she is designed to carry aircraft for commercial purposes. She carries three Naval amphibian "Walruses," housed in a special hangar at the after end of the boat deck, which are to be catapulted off the ship and used mainly for whale spotting and reporting weather and ice conditions.

The *"Balaena"* will act as "mother" ship for a fleet of about ten whale catchers and she is well equipped to carry out maintenance and damage repairs during the whaling season. Her factory not only contains one of the largest whale oil producing plants, but is also provided with the most elaborate by-products plant yet installed on a whaler.

The following are the main technical particulars of the vessel:

Length between perpendiculars	535 ft.
Breadth moulded to Tank Deck	74 ft.
Breadth moulded above Tank Deck in way of factory ..	77 ft.
Depth moulded to Tank Deck ..	35 ft.
Depth moulded to Flensing Deck	57 ft.
Displacement about ..	32,000 tons
Gross tonnage about ..	15,000 tons
Nett tonnage about ..	7,200 tons
Deadweight carrying capacity about	21,000 tons

The vessel is of the two deck type with open bridge, forecastle and boat deck aft. The space between the upper (or flensing) deck and the lower (or tank) deck is occupied by the factory plant and machinery. Immediately below the tank deck are the large cargo storage tanks for whale oil and other products. The whales caught by the attendant whale catchers are hauled up a slipway, which



Stern view showing slipway, aeroplane on catapult, crane, and petrol tanks which can be dropped into the sea by means of emergency quick-release gear.

lies aft above the two propellers, on to the flensing deck.

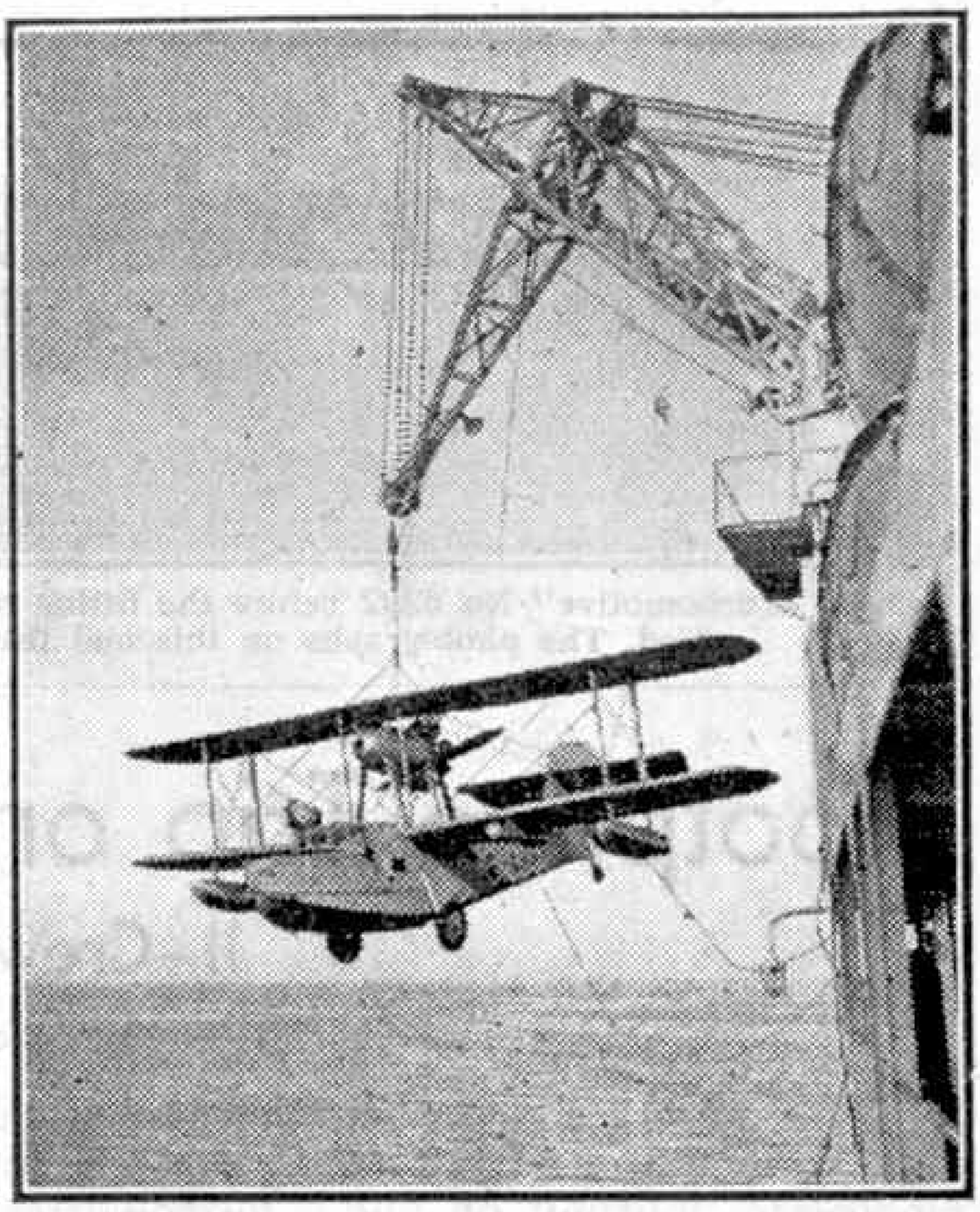
It is essential for efficient production that the area of this deck should be as large as possible. On "*Balaena*" this has been achieved by special design, including the placing of the forecastle further forward than usual and the widening of the ship above the waterline, making the flensing deck 321 ft. 6 in. long, and 77 ft. wide.

On this deck the whales are stripped of blubber (flensed), and then cut up; the pieces of blubber, meat and bone are dropped down small hatches into the various boilers and plant below for extracting the oil and by-products.

On the flensing deck the whale carcases are handled by nine 10-ton derricks, four five-ton derricks, 16 steam winches, nine electric winches, 10 warping capstans and two 40-ton winches. These two large winches are used for hauling the whales up the slipway. In addition there are four steam saws for cutting up the bones.

On "*Balaena*" the factory space (between the tank deck and flensing deck) is about 375 ft. long by 77 ft. wide and 22 ft. high. Throughout the greater part of the factory there is a flat, or intermediate deck, 7 ft. above the tank deck, on which most of the main factory machinery is seated. Below this flat and on the tank deck are placed the remainder of the machinery, the factory driving units, pipes, electric cables, and hatches to the oil storage tanks.

The main factory machinery consists of 22 pressure boilers for the treatment of bone, 10 pressure boilers for the treatment of blubber, eight Kvaerner type rotating digesters, liver extraction plant, meat meal plant and separator plant. Care has been taken in the layout to ensure that all



Lifting the aeroplane from the sea up onto the hangar deck.

machinery is accessible both for easy operation and for repair. Space has been reserved for future developments.

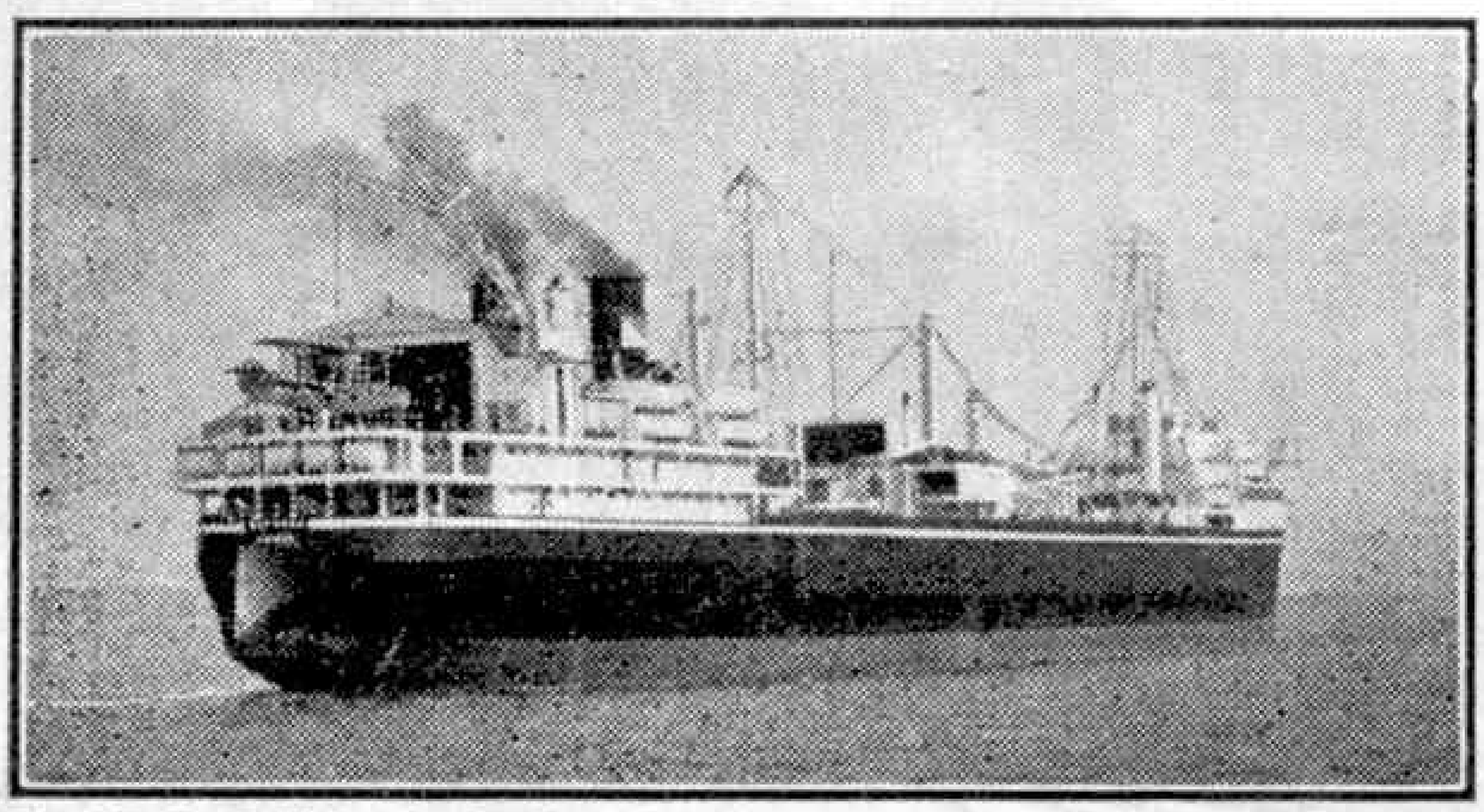
A conveyor belt runs for nearly the full length of the factory, and two elevators from this conveyor are fitted, one forward and one aft, for discharging finished products to ships alongside.

A quick freezing plant has been installed in order to freeze the choicest parts of whale meat for human consumption. This frozen meat is then stored in refrigerated chambers on the ship, or transferred to a refrigerator vessel.

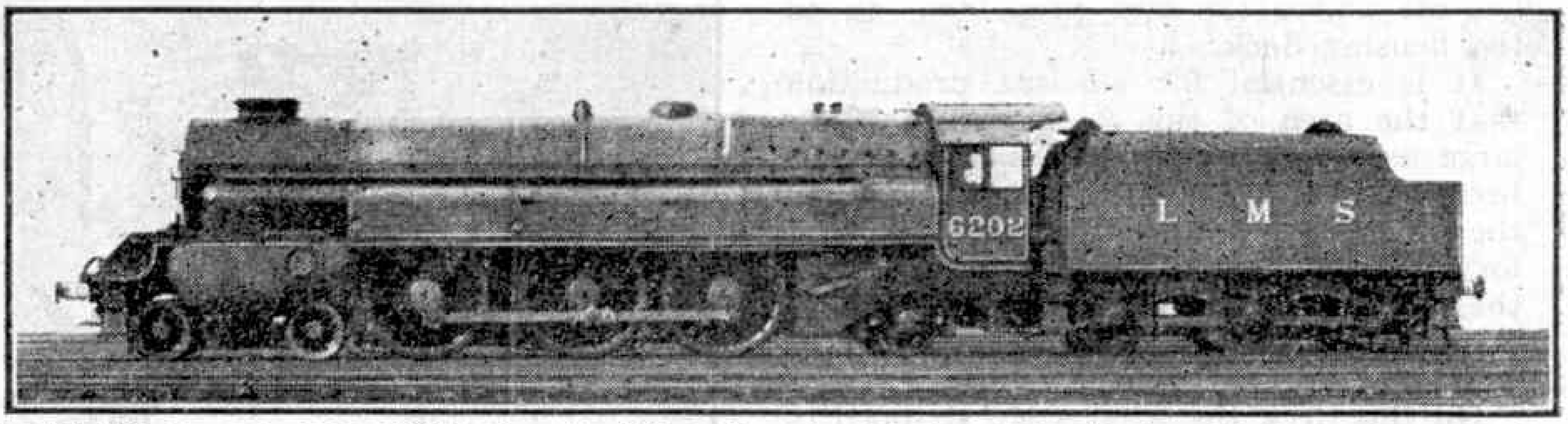
The main cargo tanks have a capacity of about 19,150 tons. On the outward voyage to the Antarctic these are filled with fuel oil. As this fuel is gradually consumed the tanks are cleaned and utilised for storing the whale oil which has been produced and purified in the factory.

2,240 tons of fresh water can also be carried in deep tanks forward, in the forward and after peaks, and in the tanks below the slipway.

The propelling machinery is fitted aft and consists of two direct acting triple expansion steam engines of the (*Continued on page 522*)



The "Balaena" leaving Belfast Lough, 17 months after the laying of the first keel plate.



L.M.S. "Turbomotive" No. 6202 before the fitting of smoke deflectors, but with domed boiler and separate top feed. The photographs on this and the following page are by courtesy of the L.M.S.

Footplate Trip on the *"Turbomotive"*

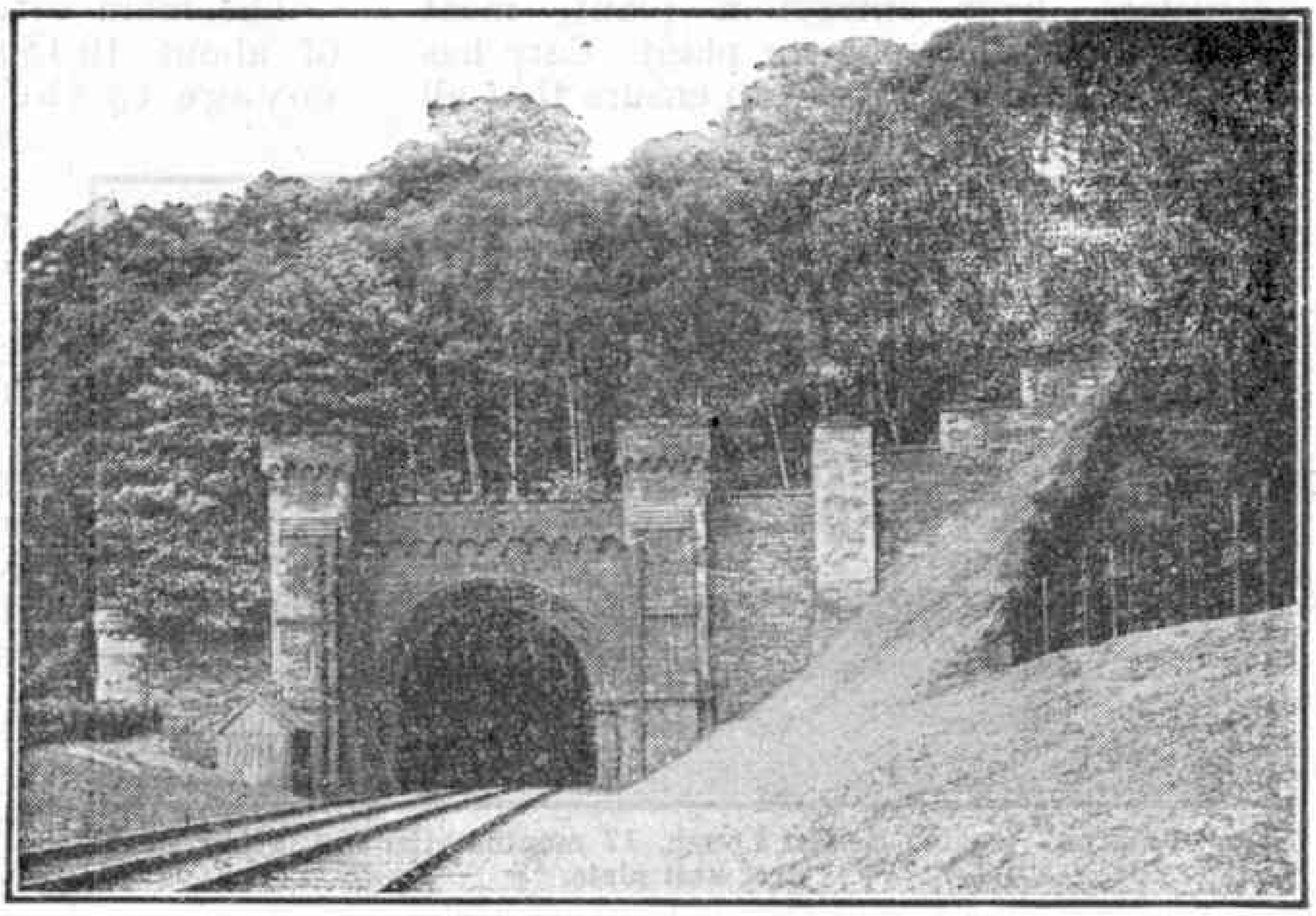
II—Crewe to Euston

By "North Western"

LAST month I described the first stage, from Lime Street to Crewe, of my footplate journey on the *"Turbomotive"* from Liverpool to Euston. This month I deal with the second part of the run, from Crewe onward.

While our train was standing at Crewe the corresponding up evening express from Manchester had run in in the dignified charge of two Stanier 4–6–0s, one 2-cylinder and the other 3-cylinder. Some anxiety was then expressed as to whether we should "get the road" and so have a chance to cancel out the effect of the various slacks; the gods of Control were not with us that night and the rival "Manchester" got away first. We followed, and in starting up the singing noise of the gear train of No. 6202 was plainly heard. Three valves were in use to get the train under way and to give us a run at the 1 in 177 of Madeley Bank. As soon as we started Robinson got to work and put on a good fire as we steamed out past the sheds, yards and sidings south of Crewe.

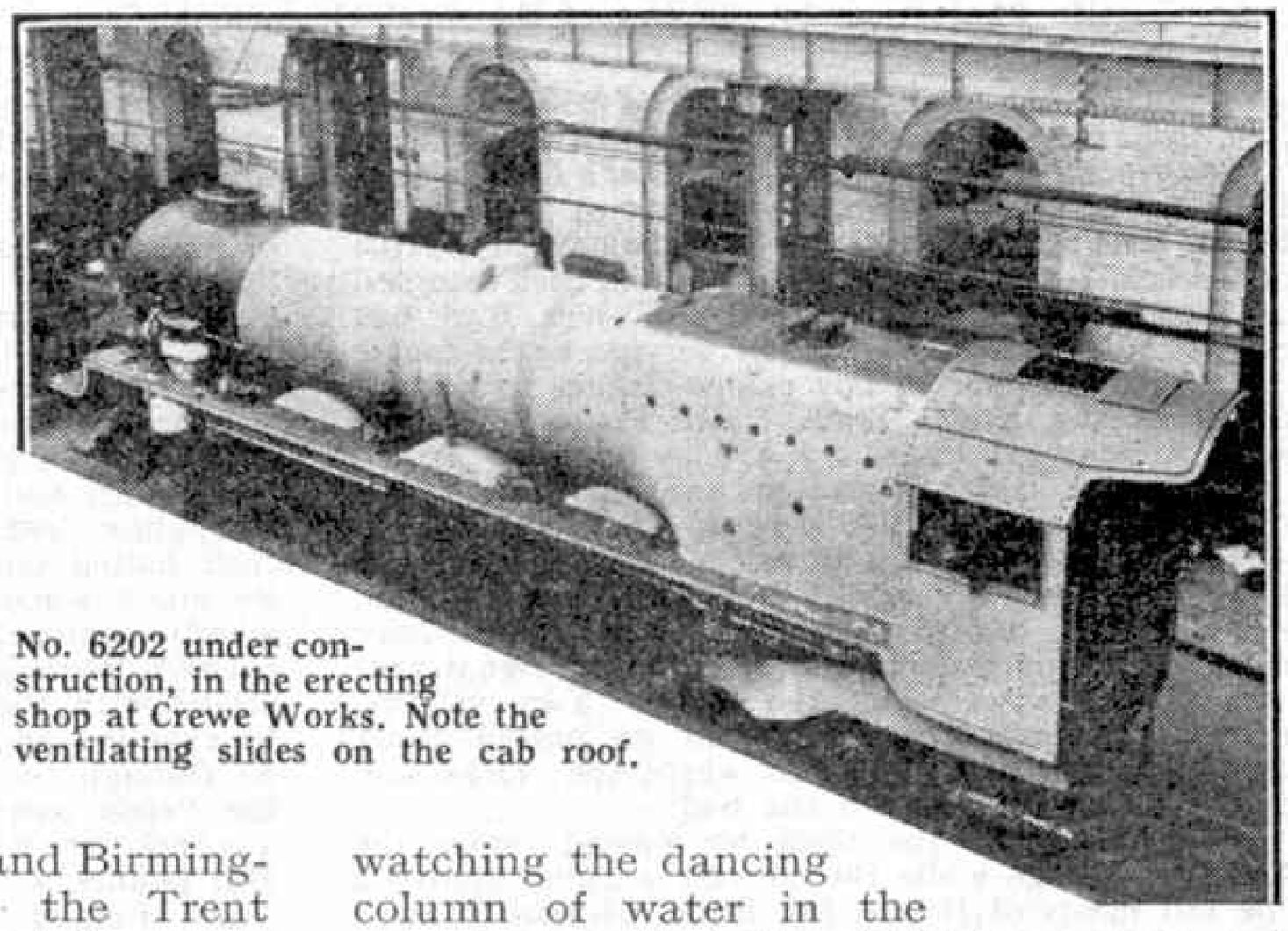
Being wise in the ways of the iron road, Driver Worman did not press the engine unduly. Even so we were checked at Basford Hall, and took things gently up the bank. Three "fires" were put on during the climb and we topped the summit with the gauge showing 225 lb. The boiler was due for washing out, but skilful work with the injector and shovel ensured that we were at any rate not "shy for steam." As we approached Whitmore where the next set of troughs lay, the reason for our gentle climb was explained. We needed to pick up water there, and with the "Manchester" in front with two engines also requiring to pick up, we might not have been able to fill our tank completely. The water in the troughs might not have reached its full level had we been pressing on the



The ornamental northern entrance to Shugborough Tunnel, near Milford and Brocton.

tail of the other train. There is more in this business of train running than meets the eye!

We were going on a bit harder now, and with the easing of the gradient the usual two-valve setting was reverted to. Then came another slack but we reached 70 m.p.h. and then 75 as we approached Norton Bridge, the busy hum of our progress and the increasing rapid patter of the wheels on the joints being quite different from the restful rhythm when one travels in a coach. The *"Turbo"* is really a most comfortable engine to ride on, even though my seat, or rather the fireman's seat, was now becoming a little hard! At Norton Bridge two blasts on the hooter were given to indicate to the "boxman" that we required right of way through Stafford to the Trent Valley line. When we approached, there were the signals showing clear, so a rousing blast was our greeting to Stafford as, easing for the junction beyond, we passed through the station platforms. At Trent Valley Junction the older road to Wolverhampton and Birmingham goes straight on while the Trent Valley line, which we were to take, veers left through the splendid sweep of Queensville curve.



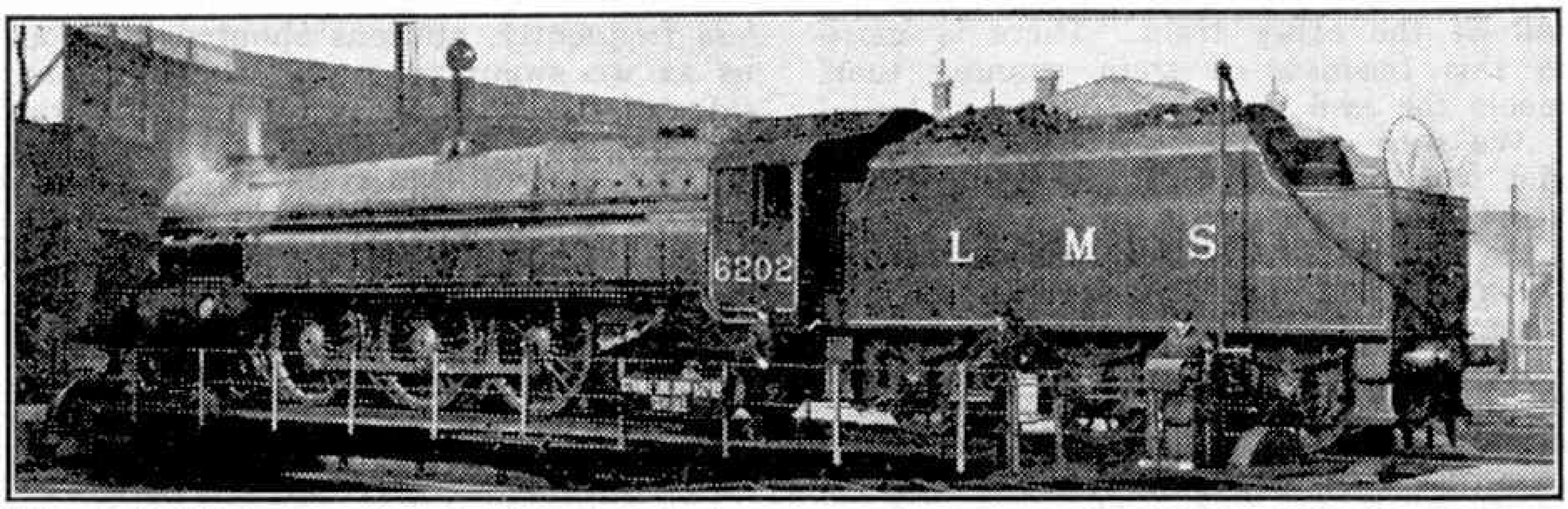
No. 6202 under construction, in the erecting shop at Crewe Works. Note the ventilating slides on the cab roof.

So we entered the Trent Valley line and soon were threading the darkness of Shugborough Tunnel between Milford and Colwich. It was dark in the open too of course, but the sense of being shut in seems to make a difference to the darkness of a tunnel. The noise of our passage re-echoed from the sooty arch above, lit up in the glare from the fire; steam swirled past the cab, and then quite suddenly we were out and approaching Colwich at 55 m.p.h. with the usual two jets in use.

Along this rather uneventful road the sense of isolation was marked especially when running between stations. There we were, four of us in the cab, in a little world of our own for the time being. Before us the "front," its hot metal bulk carrying gauges, valve wheels and pipes; behind us the tender like a steel wall following inevitably. Overhead, exhaust steam streamed backward and from below came the racket of the wheels. Outside, lights could be seen here and there over the darkened countryside; bridges and, less frequently, stations shouted back at us as we swept past. On the left-hand side of the cab Driver Worman was handling No. 6202 with a master's touch, his eyes scrutinising the signal lights ahead, and now momentarily taking in at a glance the details of the great engine's working, steam pressure, water level, speedometer reading and so on.

His mate Robinson was more physically active, as his job demanded; now breaking coal, then feeding it with unhurried rhythmic action into the hungry fire; watching the dancing column of water in the gauge glass and the tell-tale pointer of the pressure gauge, and adjusting the injector accordingly. Yet he still managed to be on the lookout for signals when, as sometimes happened, these were more easily seen from our side of the cab; and in addition, as he was taking a "breather," he would have a word or two with me concerning his work, the road or the running of the train.

So we swept on, Fitter Broach watching the working of the engine and keeping me informed from time to time as to our whereabouts. Rugeley, then Armitage were passed, and approaching Lichfield we caught a distant "on," but the home luckily cleared before we came to a stand. We were not so fortunate at Polesworth, however, after Hademore Troughs, where the usual picking up ritual was observed, and Tamworth where we were 5 minutes down on schedule. A warning distant checked us, so we began slowing, and then almost as soon as we had come to a stand, "off" went the home and the starter together. Once more No. 6202 had to get the train on the move, this time from a dead stand, and our chances



"The Turbo" being turned at Camden. Note the hose connection between the tender and the turntable power unit. Photograph by courtesy of the turntable makers, Cowans, Sheldon & Co. Ltd., Carlisle.

of being on time receded. Just at this point the 5.30 p.m. from Euston passed us, going well with No. 6200 "*The Princess Royal*" at its head. "*That's Larry Earl,*" I was told, as the greeting whistle swept back to us, Driver Earl being one of the well-known speed wizards of the L.M.S. whose doings have so often been recorded in the "*M.M.*" Since that day Driver Earl has retired, after 45 years' railway service, in the course of which he rose from boy engine-cleaner to become driver of the Royal Train, "*The Royal Scot*" and other famous expresses.

Atherstone, then Nuneaton an important traffic centre, were passed. We were up to 55 m.p.h. now and on two jets when a 15 m.p.h. slack at Brinklow had to be observed so down came our speed again. At Newbold Troughs the tank was refilled once more, then approaching the colour light signal area at Rugby we were checked again. Two yellows, then a welcome green light, and we passed under the great roof of the station where the clocks said 8.10 p.m.; 12 minutes to the bad!

Out again into the open we passed under the L.N.E.R. bridge while the aircraft warning lights on the tall masts of Hillmorton Radio Station gleamed redly to our left. Up the climb to Kilsby Tunnel we pressed and then into the tunnel, where under the two great shafts the blackness, even at night, seems less intense. Out again, then down the slope past Welton, where across country to the right appeared another group of aircraft warning lights indicating Daventry wireless station, the whole giving the impression of a giant signal gantry hung up in the sky. We were beginning to move again now with 68 m.p.h. at Weedon, boiler pressure being round about 225 lb. More coal was got forward as strenuous work had made rather a hole in the supply at the front of the tender. This meant opening the folding doors above the shovelling plate and getting into the tender. Having finished his coal-heaving Robinson applied the hose, closed the doors and once more tidied up.

Boiler pressure was now on the upward trend and we bowled along the level hereabouts at 65 m.p.h. towards Blisworth, then up to Roade Summit, and down again through the station. A slight check, then a clear signal at Hanslope Box were followed by a tearaway dash over Castlethorpe Troughs at 70 m.p.h., water being again picked up here while the now familiar water-softening tower at this point loomed eerily at the lineside like a stranded lighthouse.

Wolverton, a railway centre famous for its carriage works where our train had been built, was dim and deserted-looking as we sped by. Then came Bletchley; 16 minutes late now, in spite of our haste, and we pressed on to the final climb up to Tring from which point the line falls practically all the way to Euston. The rise is gentle at first, 1 in 660, 1 in 1683, 1 in 927 through Linslade Tunnel, followed by a slight dip, and then came the final six miles at 1 in 333 where at Cheddington, more than four miles from the top, we were doing 55; then just over 50 at the summit point where the pressure gauge showed 225 lb. of steam. A brief sprint up to 74 m.p.h. down the southern slope was rudely cut short by another dead stand before we plunged into the resounding blackness of Watford Tunnel. We were now fairly on the "home stretch" and at Watford we entered the electrified suburban area. Bushey Troughs—more water again!—then Robinson tidied up once more, his more strenuous labours being over for this trip.

Suburban stations flashed by in quick succession until, approaching Wembley, there was some whistling for signals, and an ominous "yellow" followed by a forbidding "red," both visible at once, checked and then halted our progress at Brent Viaduct. There we stood some minutes while buffers clanked and wheels rumbled in the busy sidings that stretch between Wembley and Willesden. Here Fitter Broach, armed with the usual "duck lamp," dropped down to examine an axle box that he had been nursing all through the day. He climbed aboard as we got the "*right away.*" Then came Willesden Junction, a check at Kilburn, South Hampstead, Primrose Hill Tunnel, a check and yet another stop by Camden Yard. Finally at 10.7 p.m. we came slowly to a standstill at No. 3 platform at Euston. The main regulator was now shut off, as is usual when the engine is likely to stand some time, and Driver Worman made the habitual examination of his engine. We were late; but in all fairness the time could not be booked "against the engine."

The fire by now was down considerably, a mass of red incandescence above which the brick arch gleamed like pink ice. "*Just as a brick arch should be*" I was told; it certainly looked very sound and cleanly put up.

After the inevitable wait the carriage pilot engine was attached at the rear of the train and at 10.59 we began to back out. The empty carriage lines lead out to the "subway" by means of which empty trains cross under the main running lines from the up side to the down without interfering with other movements. We had to wait some time in the subway itself, and then having parted with our train we were able to make our way to the shed. We backed up to the turntable, a 70 ft. affair capable of holding the largest express engines. This turntable like many others on the L.M.S. nowadays is of the vacuum-operated type. The brake hose of the engine is connected to a similar fitting on the turntable. The locking bolts of the latter being released, the engine's vacuum ejector is put into action and operates through the hose connection the vacuum tractor unit attached to the turntable. So the engine literally turns itself round. Turning being completed the locking bolts are shot home, the vacuum is destroyed, the vacuum pipes disconnected and replaced on their respective plugs or "dollies," and the tractor clutch mechanism is put out of engagement. These "ground jobs" are usually performed by the fireman.

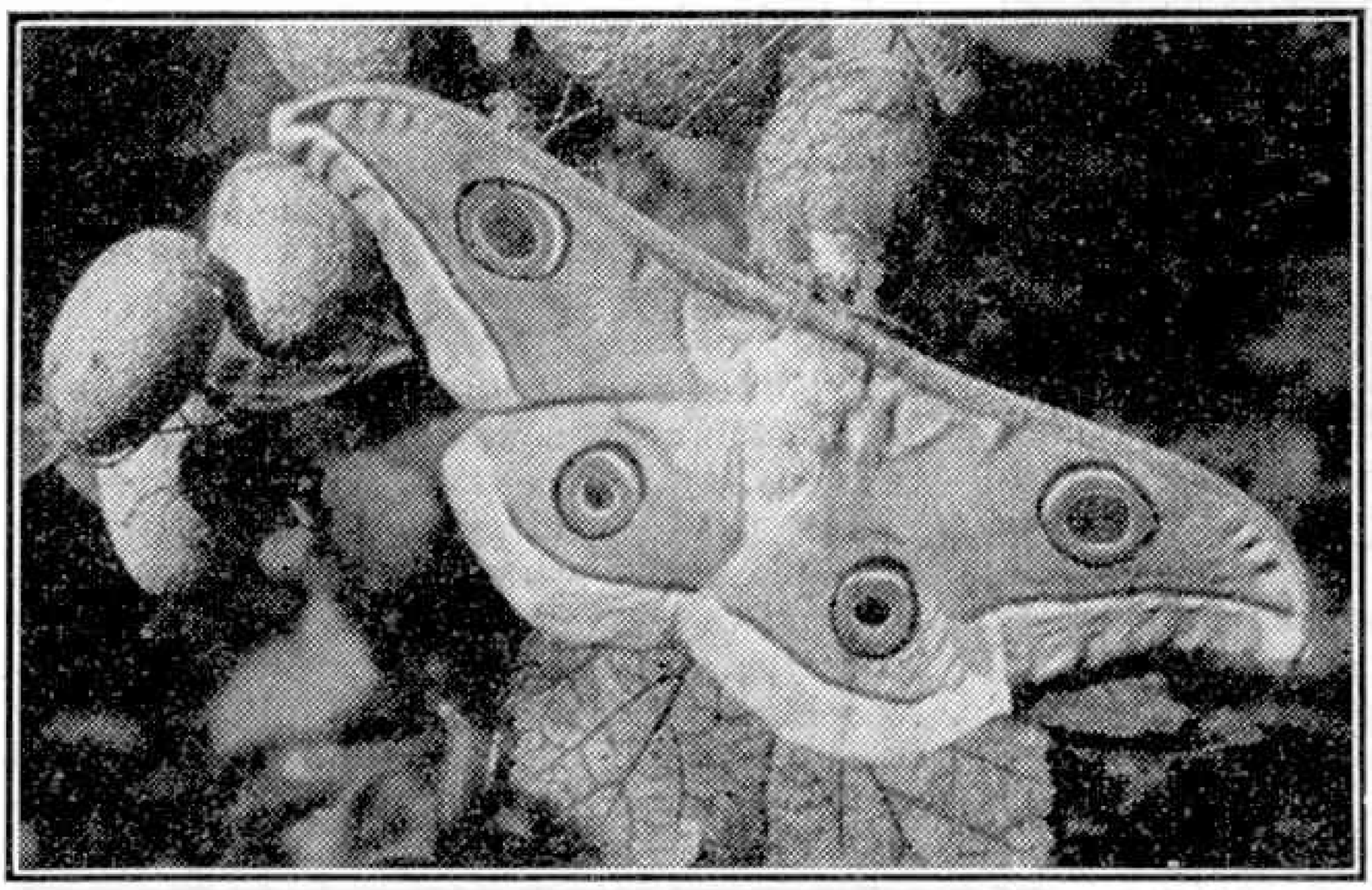
No. 6202 was now turned (*Continued on page 522*)

The Giant Silk Moths

Coloured Wonders of the Insect World

By L. Hugh Newman, F.R.E.S.

THE majority of the giant silk-producing insects of the world, and certainly the most handsome of them, fall into a group called the Saturnidæ. This is really a very good name, as so many of these lovely moths have curious "eye-spots" on their wings that rather resemble pictures of the ringed planet Saturn. You can roughly divide them into two groups, those that inhabit the New World and those that live in the Old. The best known of the New World group are the Robin moth, the American Moon moth, the gay Bull's Eye moth, the Polyphemus, the Giant-Eyed Silk moth, and I almost forgot, the pretty Cherry moth; from the Old World come the Ailanthus, or Tree-of-Heaven Silk moth, the Indian Moon moth, the beautiful Golden Emperor, the Tussore, and the Giant Atlas which has a wing span of just under a foot. A colourful cavalcade, I am sure you will agree.

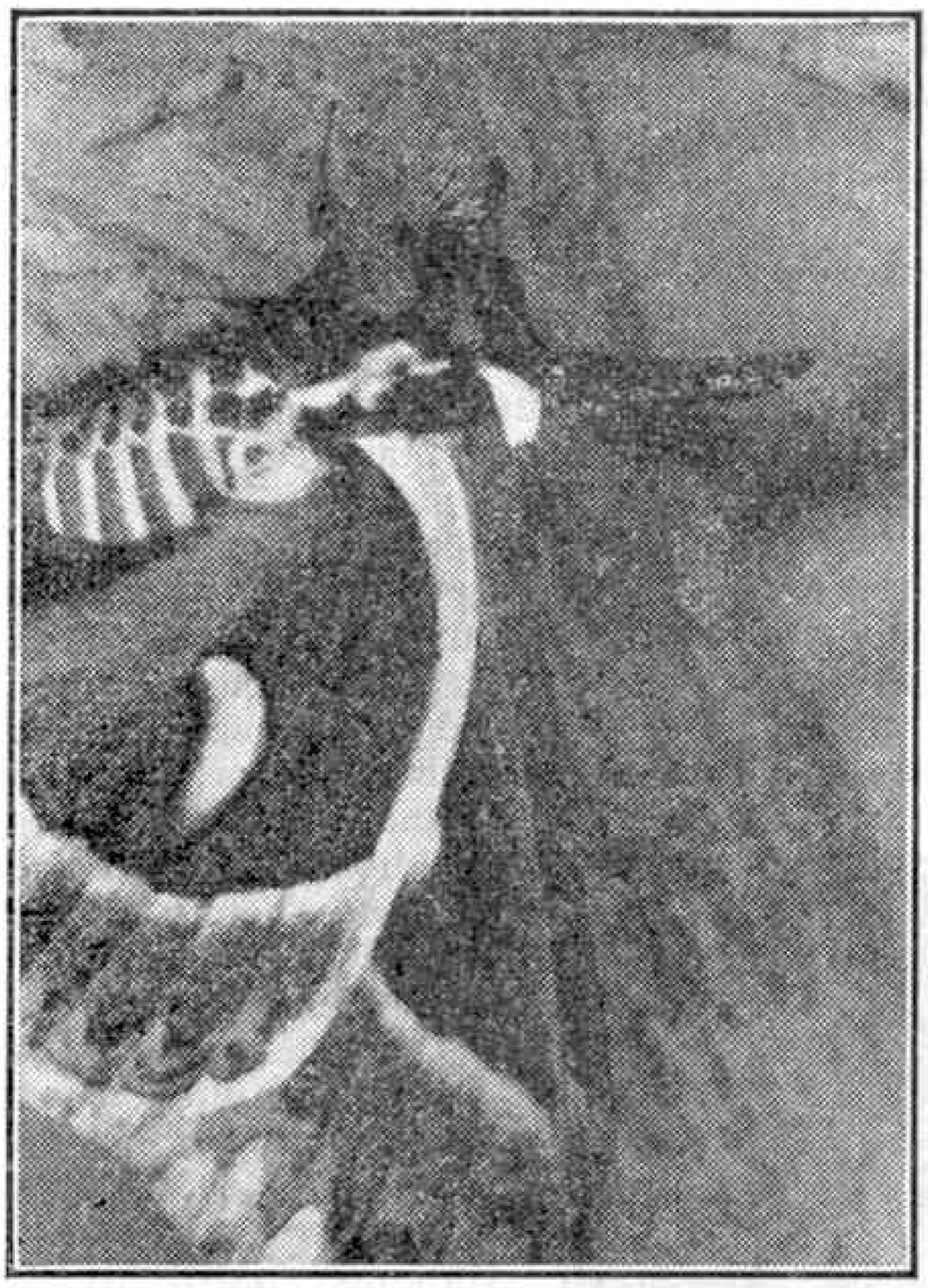


The Indian tussore silk moth and a group of cocoons. It is from the silk of this moth that the famous tussore silk is obtained.

Throughout the war I have had to control my enthusiasm for rearing strange foreign insects, as they were not being imported by air mail in the usual manner; space in aircraft was reserved for more important cargoes than silk-moth cocoons. But early last spring supplies began to arrive in this country again, and I was lucky enough to get enough cocoons from both the United States and India to build up a stock during the summer on my "Butterfly Farm." It has been a thrilling experience watching them emerge from their rough silken cocoons, hang from the top of a breeding cage and slowly dry their magnificent colourful wings. And then at dusk I would return to the "Farm" when all my staff had gone home to bed, and I would watch their wings begin to tremble, and just as the light faded in the sky see them take to the wing . . . . .

The Moon moths fly round and round in circles, trailing their long green tails behind them; the Robin moths flutter their wings continuously, hardly flying at all, but "walking" along the top of the cage, backward and forward, head hanging downward; while the Giant Atlas sails silently round like a huge bat, except that it is a beautiful creature, not a hideously ugly one.

Pairing the moths in captivity is not as difficult as you would imagine. As long as the cage is big enough for the moths to fly freely, no special conditions are needed. I have found a current of fresh air is very helpful, but it is not essential. No artificial heat is required, as all the species that can be bred in this country come from temperate climes, and even the Indian ones breed, for the most part, quite high up on the Himalayan Mountains. The American and Canadian species can even stand snow and frost, as in their natural surroundings they are often buried in snow for months on end in the vast backwoods of those countries. The most important thing to remember is that the silken cocoons soon get very dry and tough if kept indoors. So from the early spring onward, those of you who contemplate breeding silk moths should damp



The lovely Robin silk moth of North America, which has a wing span of about 5 in., and is beautifully marked and coloured.

your cocoons two or three times a week with tepid water; then when the moth has formed up inside the pupa it will more easily be able to force its way out of its silken shroud.

The Indian Moon moths were the first species I succeeded in mating this spring. They lay their eggs in clusters on the side of the cage, and after the first night it is best to transfer the female to a cardboard box with a muslin top in place of the lid, as she lays better if she is not disturbed by the others you may have in the cage. The eggs are about the size of hemp seeds, and are dark brown in colour.

In about a month, a little earlier or later depending upon the weather conditions, the caterpillars begin to eat their way out of one end of the shell. When you first see them they look just as though they are wearing football jerseys, as they are striped in red and black. After the first skin casting they lose the black, and appear in an all-red coat dotted with tiny black "warts." And then comes the most remarkable change of all. After feeding for another week or ten days on a diet of plum and hawthorn leaves the caterpillars retire into a corner of the cage to prepare for the next change of skin. Within twenty-four hours they have shuffled out of their red skins and emerged as brilliant apple-green caterpillars. It is difficult to believe they are the same species.

After this final colour change the caterpillars begin to feed up rapidly and consume immense quantities of green leaves, many times their own weight each day. The minute black "warts" seen all over their bodies when in the brick-red stage of their lives are now large yellow tubercles, and each one is crowned with a magnificent tuft of sprouting hair. The largest caterpillars are always the females and they may measure up to four inches long. You can always be certain when they are ready to commence spinning up, as the brilliant colours fade and they begin to shrink in size.

The fully fed Moon moth caterpillars turn a light greenish-brown almost like a bruised apple. They wander away from their food very often, and begin spinning their silken cocoons in the corners of the cage, although some prefer to spin up between a cluster of leaves. The caterpillars that select sites actually on the food plant are very well camouflaged, as the cocoon woven between leaves is scarcely visible unless one is actually searching for it. By the following day the caterpillar spinning its cocoon will be lost from sight behind a thick screen

The Moon moth caterpillar, a curious creature with whiskers all over him.

of brownish coarse silk, but the cocoon is by no means complete, and if you listen very carefully you can hear the caterpillar moving about inside, making the soft inner lining of silk on which the pupa rests after the caterpillar has cast its skin for the last time in its life.

In this country quite a big percentage of the Moon moths emerge in the Autumn; they are in fact double brooded. And while it is too late to pair them up, and raise another generation, it is most interesting to see the live moths so soon after they have pupated, and enough generally lay over until the following Spring to form a nucleus breeding stock.

Watching the moth emerge, you have little idea what beauty is in store as an ugly-looking insect with ponderous body heaves itself out of its cocoon after much struggling. But as the crumpled bag-like wings expand and the tails begin to lengthen, and the insect fans them to and fro as though pumping air into the hollow ribs that traverse them, their loveliness is slowly revealed. I think the writer who said the following about my favourite silk moth, the friendly Robin moth, expresses my feelings exactly: "For thousands of years man has cunningly laboured with textiles and dyes . . . . . then Nature quietly reveals this magnificent *cecropia* moth, a beauty so transcendent that we look back at our thousands of years of effort and sigh . . . . . "

Before the war I showed some of these giant silk moths on the television screen, and I remember the one most admired was *S. cecropia*, this Robin moth from Canada. The viewers could not see the lovely rich shades of brown on the creature's wings, or the fluffy "robin red" hair on its body, but I remember many people remarked on the pretty lace effect round the edges of its wings and the way the plump body seemed gaily striped, and my description of the insect filled in the colours. Next summer I hope to have enough to be able to make a really fine display at Alexandra Palace now that television has started up again.

I also hope to travel abroad again, when conditions become a little more settled. I should like to go to India and see some of the Silk moth caterpillars in the wild. One of them, *Bombix Huttoni* by name, has an extraordinary instinctive power of detecting the approach of a hailstorm, which one imagines would be most painful to these large, soft-bodied caterpillars. Captain Hutton, a collector in India after whom they were named, describes how they never wait until the fusillade of hailstones begins, but as soon as the peals of thunder are heard, the whole brood in the vicinity seem to regard the noise as a warning trumpet-call, and hastily seek shelter beneath the thickest branches of foliage, remaining there until the sun comes out again and the storm has passed on.

The American oak silk moth.

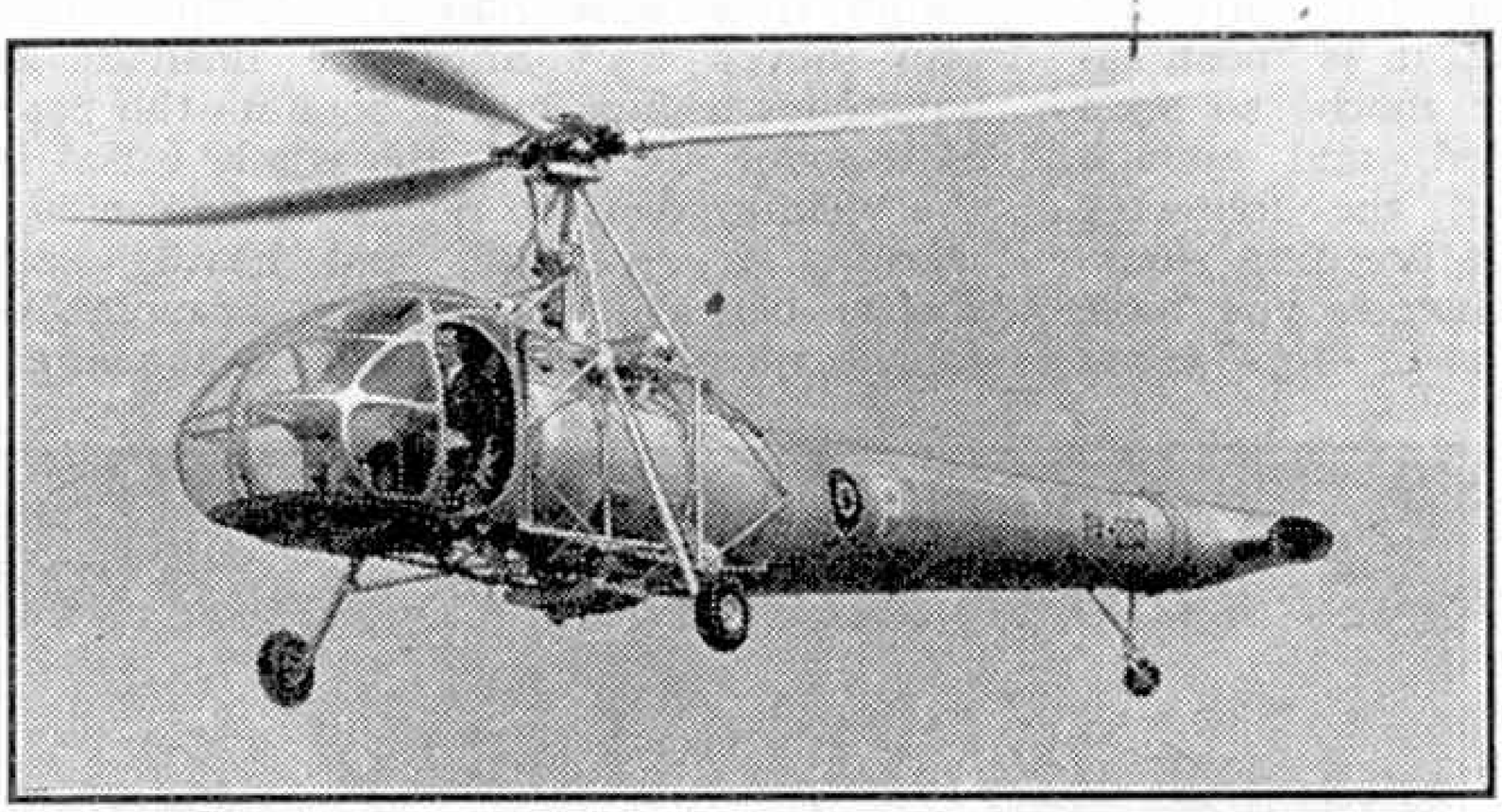
I should like to see the Atlas moth caterpillars too, as they are wonderfully protected by Nature from their numerous enemies. The skin of the Atlas moth caterpillar is powdered all over with a strange waxy substance, one presumes to protect it from catching a chill when the temperature drops suddenly as the sun goes down, as it does in this part of the world. It also has a row of spines down its back, pointing backward like a porcupine's. In fact it has evolved the perfect protection against insect-eating birds, as the spines would certainly stick in its gullet and make swallowing impossible if an unwary bird should ever attempt it.

If you should decide to try your hand at breeding these Giant Silk Moths be sure to make preparations early in the New Year, and write to me if you want advice.

Cierva W.9 Helicopter

By John W. R. Taylor

NEARLY ten years ago—on 9th December 1936 to be exact—a Douglas DC-2 air liner attempting to take-off from Croydon aerodrome in thick fog swerved and crashed into some houses. Fifteen of the occupants of the 'plane were killed, among them Juan de Cierva, one of the world's most brilliant aircraft designers.



The Cierva W.9 Helicopter takes the air. Photograph "Flight" copyright.

It was ironical that Cierva should have died in this way, for he had devoted his life to developing an aeroplane that would make just such accidents unnecessary. Ever since 1923 he had waged a lone struggle to prove that rotating-wing aircraft are not only practicable but offer far higher standards of safety than conventional fixed-wing types. For, as their wings are already moving quite fast through the air, they need little or no forward speed to provide lift to keep them airborne. Consequently, in bad weather they can feel their way along, much as cars do in foggy conditions.

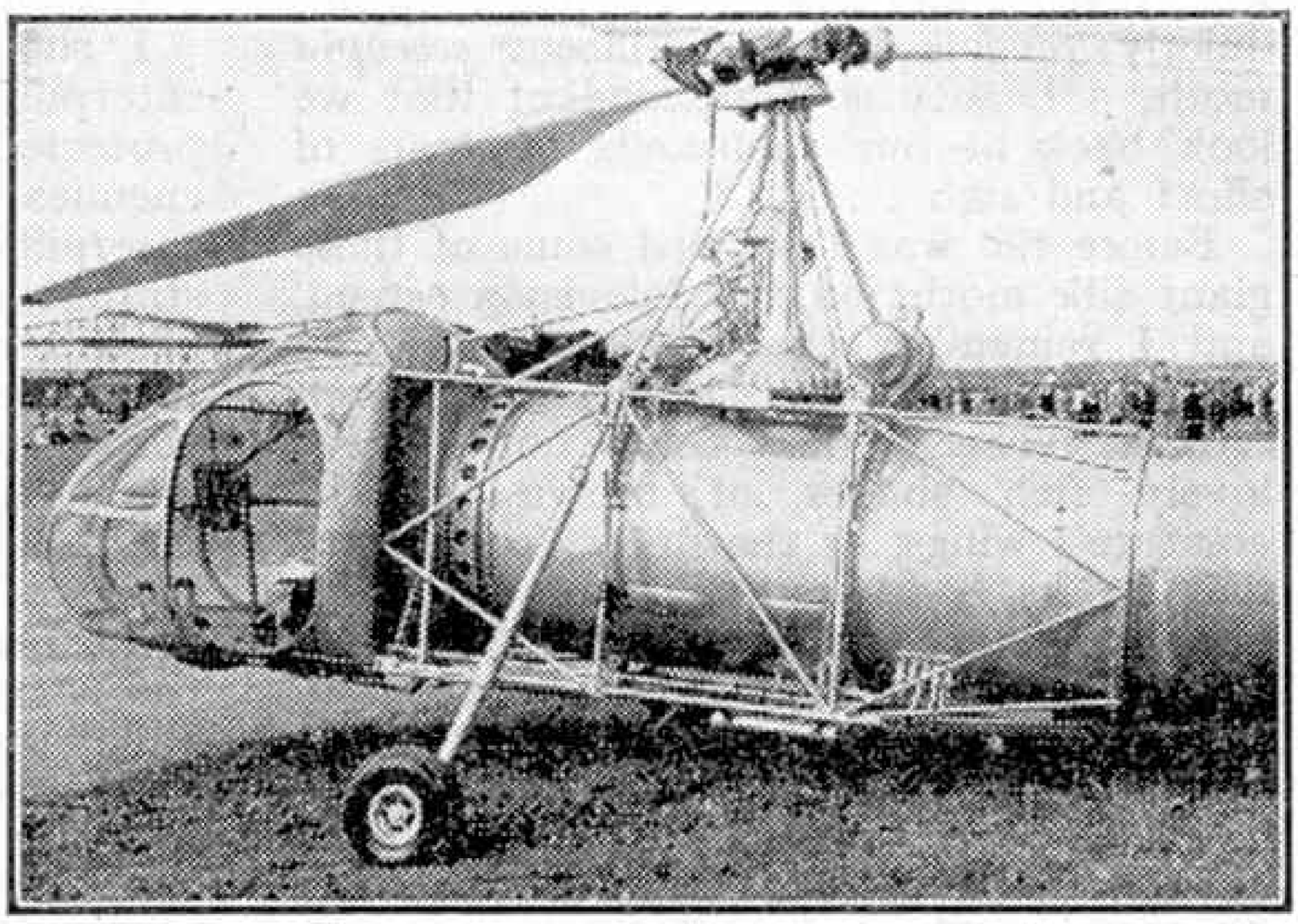
Cierva's first design was basically an old Avro 504 biplane with its top wing removed and replaced by a four-bladed rotor. He called it the Autogiro. But, although this machine could fly very slowly and was impossible to stall, it could not hover, or take off and land without a forward run. Cierva's aim was to develop his Autogiro to do these things and so cut out also the normal risks of accidents during landing and take-off.

He worked untiringly. By 1936 he had discovered that he could dispense altogether with fixed wings and tail-planes, and his "Autogiros" could make vertical jump-starts and almost vertical descents—then he was killed. But his work lived on and, in 1938, Cierva's licensees, G. & J. Weir Ltd., flew and demonstrated their type W.5, which was the first successful British helicopter. In the following year they built the W.6, which was a larger development of the same thing. Now, as the Cierva Autogiro Company, they have built the W.9, which utilises for the first time jet-thrust to provide torque balance and directional control. This is a great improvement on the complicated and weighty tail rotors in general use in America.

The chief difference between an Autogiro and a helicopter is that the latter has a motor-driven main rotor which provides forward motion as well as lift, whereas an Autogiro has an ordinary propeller to pull it forward, its rotor being turned in the air simply by the airstream. Because its rotor is power driven, a helicopter can take off and descend vertically — consequently the W.9 brings very near the fulfilment of Cierva's dream of safe flying.

Many details of the construction and performance of the all-metal W.9 have not yet been released. It looks rather like a huge silver insect, the entrance holes in the cabin adding to the effect by resembling "eyes."

As can be seen the all-round view from the two seats is excellent. The whole aircraft is built round a central tubular strut "box," to the front of which is attached the mounting for the cabin, and to the rear the 200 h.p. de Havilland "Gipsy" Six engine and the tail boom. The engine is cooled by a fan, the annular air intake for which is immediately behind the cockpit; the mixture of "used" cooling air and engine exhaust is ejected through the elliptical orifice on the port side of the tail. As the jet-thrust is, of course, proportional to the output of the engine, it also ensures that the thrust reaction is always substantially correct to counter the rotor torque. The three bladed rotor is carried on a pillar above the engine, and supported by four tubular stays; the front pair of stays, together with the front member of the main structural "box," form two strong points upon which the undercarriage shock-absorbers are mounted.



Close-up of the W.9, showing the rotor structure. Photograph "Flight" copyright.

Air News

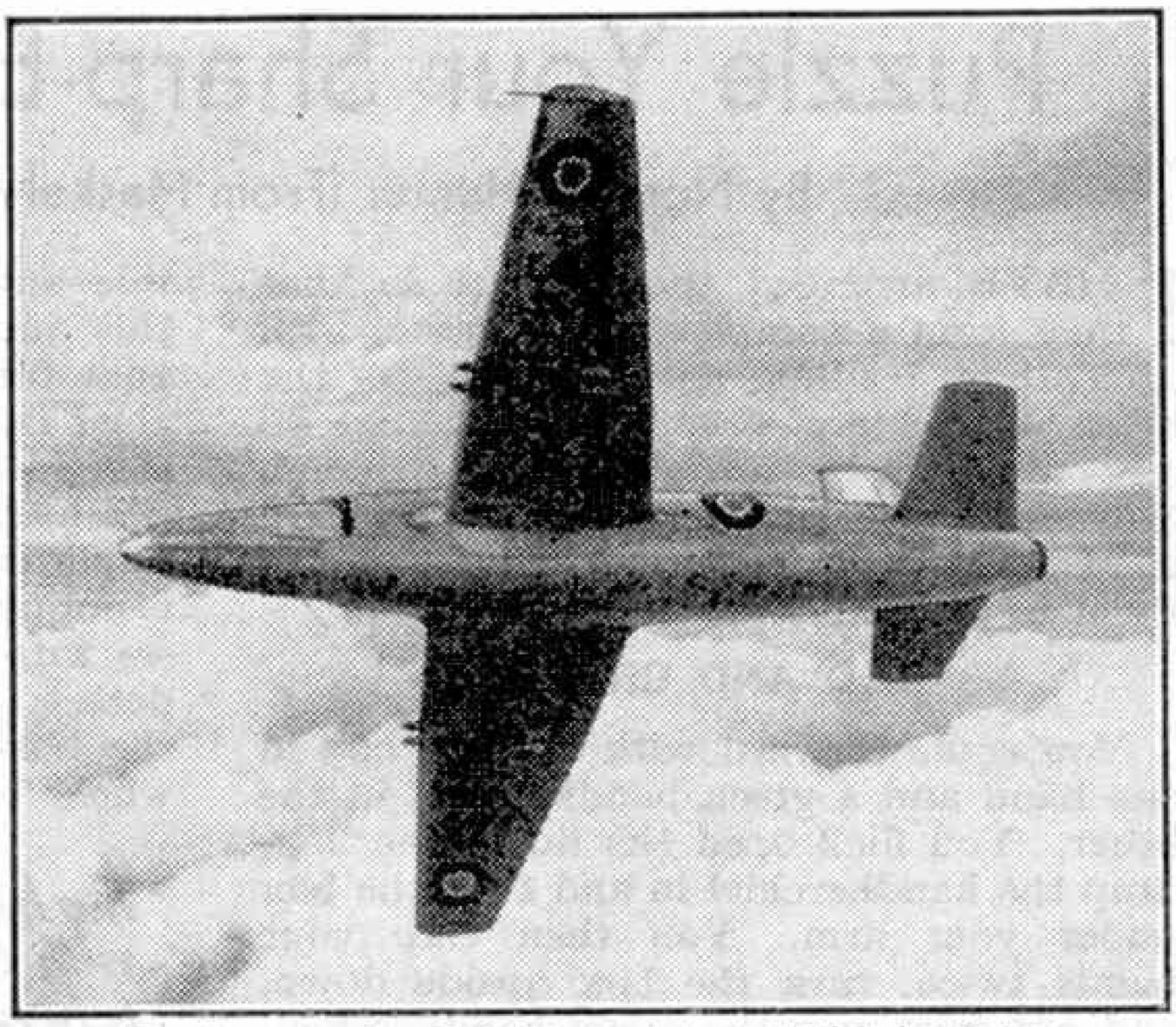
Britain's Latest Jet Fighter

British engine manufacturers have made such tremendous strides in the development of jet engines that, until recently, there was no airframe available advanced enough to test out the latest engines at full power. So, for example, when the Gloster "Meteor" set up a new world's air speed record last year it was able to make use of only some 88 per cent. of the available power of its two "Derwent" engines.

Several of the leading airframe manufacturers have now taken up the challenge, and the new Supermarine jet fighter illustrated here is but the first of a very promising series of fighters using the 5,000 lb. thrust Rolls-Royce "Nene" engine. It was designed to specification E10/44, and its designers—under the leadership of Mr. J. Smith who was responsible for all the design work on the famous "Spitfire" after 1937—decided to make use of many components of the "Spiteful" fighter to get the machine in the air as soon as possible. In consequence the wings, complete with undercarriage and guns, are standard "Spiteful" parts. This arrangement left the designers free to devote all their time to developing the most efficient fuselage possible. In keeping with the latest theories on airflow at very high speeds, the fuselage has its maximum depth well aft, which gives it an unorthodox tubby appearance.

The E10/44 has a pressure cabin for high-altitude flying, and the pilot's seat is of the ejector type, to throw him well clear of the aircraft should he have to bale out at high speed. The cockpit is forward of the wing, giving a good all-round view, and is well protected, even the nose of the machine being armoured. The "Nene" engine is housed in the fuselage aft of the cockpit and is fed with air taken in through two ducts in the side of the fuselage, the gases being ejected from the tail of the aircraft.

The wings have a span of 36 ft. and the E10/44 is 37 ft. 6 in. long. It has a normal fuel capacity of 310 gall., which can be supplemented by a 270 gall. drop tank, and is armed with four 20 mm. cannon.



The Supermarine E10/44, the latest British jet fighter.

No performance figures have been released, but it has been announced that the E10/44 is a possible contender for the world's air speed record, which now stands at 616 m.p.h. It has already proved itself very manœuvrable and controllable, and promises to be a worthy successor to the immortal "Spitfire."

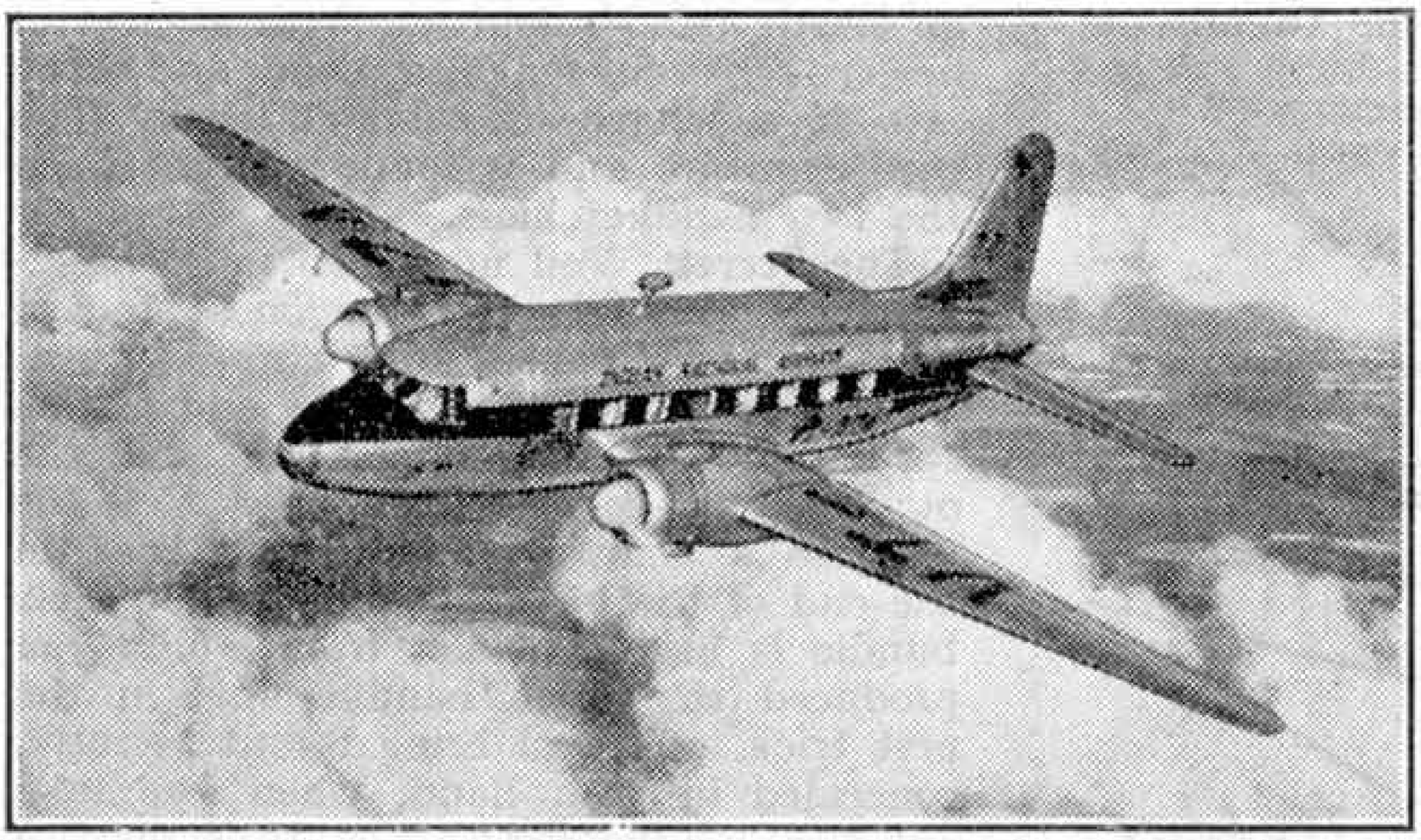
J.W.R.T.

"Viking" News

Orders for the Vickers "Viking" medium range air liner continue to come in at a most satisfactory rate. One of a number of "Viking" 1Bs built for Indian National Airways is illustrated on this page and can be distinguished from the earlier Mark 1As by its slightly longer nose. This version, powered by two 1,690 h.p. Bristol "Hercules" 634 engines, has a normal cruising speed of 210 m.p.h. at 10,000 ft. and a range of 1,200 miles, carrying 24 passengers and 460 lb. of luggage. It has a span of 89 ft. 3 in., and fully loaded weighs 34,000 lb.

British European Airways has taken delivery of its first "Vikings" and the type will in time be used exclusively on the Corporation's air routes to the Continent. Meanwhile development work is going ahead at Weybridge on two very interesting developments of the type. The first is the 30-seat Vickers V.C.2, which is now known to be powered by four of the small-diameter Rolls-Royce "Dart" "propjets." It will be somewhat similar to the "Viking" in size and general appearance, but will have a tricycle undercarriage and a blister type pilot's cockpit cover. Maximum speed is expected to be 330 m.p.h. and the range 1,380 miles. The other machine, which is nearly completed, is a "Viking" fitted with two Rolls-Royce "Nenes." It is expected to fly at about 400 m.p.h. and will be used for operational and passenger-comfort tests.

J.W.R.T.



One of the Vickers "Viking" IB air liners for Indian National Airways. Photograph by courtesy of Vickers-Armstrongs Ltd.

Puzzle Your Sharp-Eyed Friends

By Norman Hunter (From Maskelyne's Mysteries)

I HAVE arranged these tricks so that they form a complete programme, with each item leading naturally on to the next. If you prefer you can of course do any of them separately, but, although they need no special skill, be sure to try the tricks over a few times before showing them to an audience.

RED AND GREEN

You come forward with a small box in one hand and a green handkerchief in the other. You flick open the lid of the box, drop the handkerchief in and tuck the box under your arm. You then clap your hands twice, turn the box upside down, and out falls, not the green handkerchief, but a red one.

"To do that you need two handkerchiefs," you cheerfully explain. "I put the other one in my pocket while you weren't looking." And you draw the missing green handkerchief out of your pocket.

The Secret. The box is a double one, easily made by fixing two shallow boxes together, bottom to bottom. Cigar boxes will do nicely if you can get them. The lids should open opposite ways, as shown in Fig. 1. Put a red handkerchief into one side of the box, close it and turn the box over. With one green handkerchief in your pocket and one held openly in your hand you are ready. Flick open the lid of the box and drop the green handkerchief loosely into it. Close the box and put it under your arm. When you take it again, hold it with your thumb outside and your finger against your body; this automatically turns the box over so that the side containing the red handkerchief is uppermost. Turn it over and let the lid drop open so that the red handkerchief falls out, then produce the duplicate green one from your pocket. It is not necessary to let the audience actually see into the box, so they are not able to detect its shallowness. The join between the boxes is best hidden by covering the whole box with fancy paper.

FIG. 1

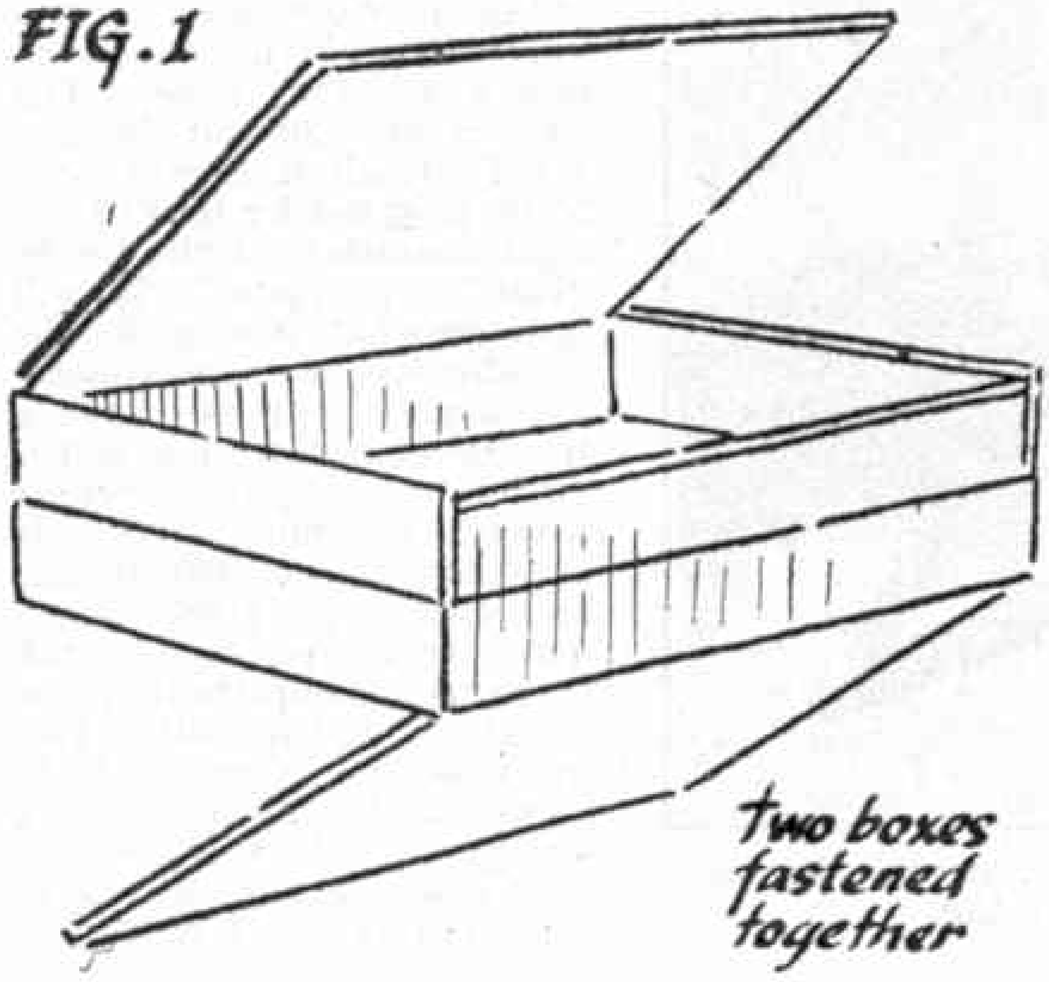
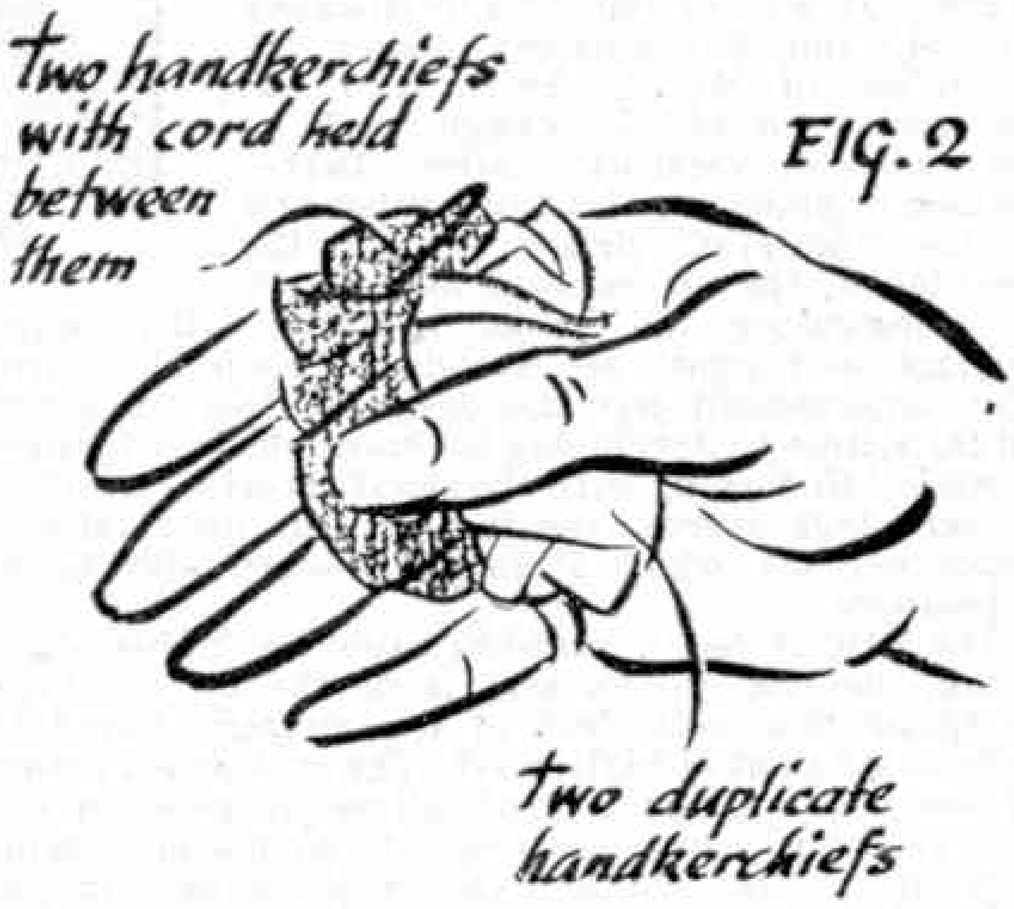


FIG. 2



Using the two handkerchiefs you then go on to

THE FLYING CORD

You tie the red and green handkerchiefs together, roll them into a bundle and put an elastic band round it. With a sheet of newspaper you make a cone and drop into it a length of coloured cord. The cord vanishes and is found tied between the two handkerchiefs.

The Secret. You need two more handkerchiefs, duplicates of the ones used in the previous trick, and two identical lengths of thin cord. Tie one end of one cord to the red handkerchief and the opposite end to the green one. Roll the lot into a compact bundle and tuck in the end of the outside handkerchief. This bundle is in the pocket from which you produced the green handkerchief in the first trick, and you bring it out secretly, concealed in your hand, when you take out the handkerchief. You thus prepare for the next trick as you finish the first—a frequently used dodge in conjuring.

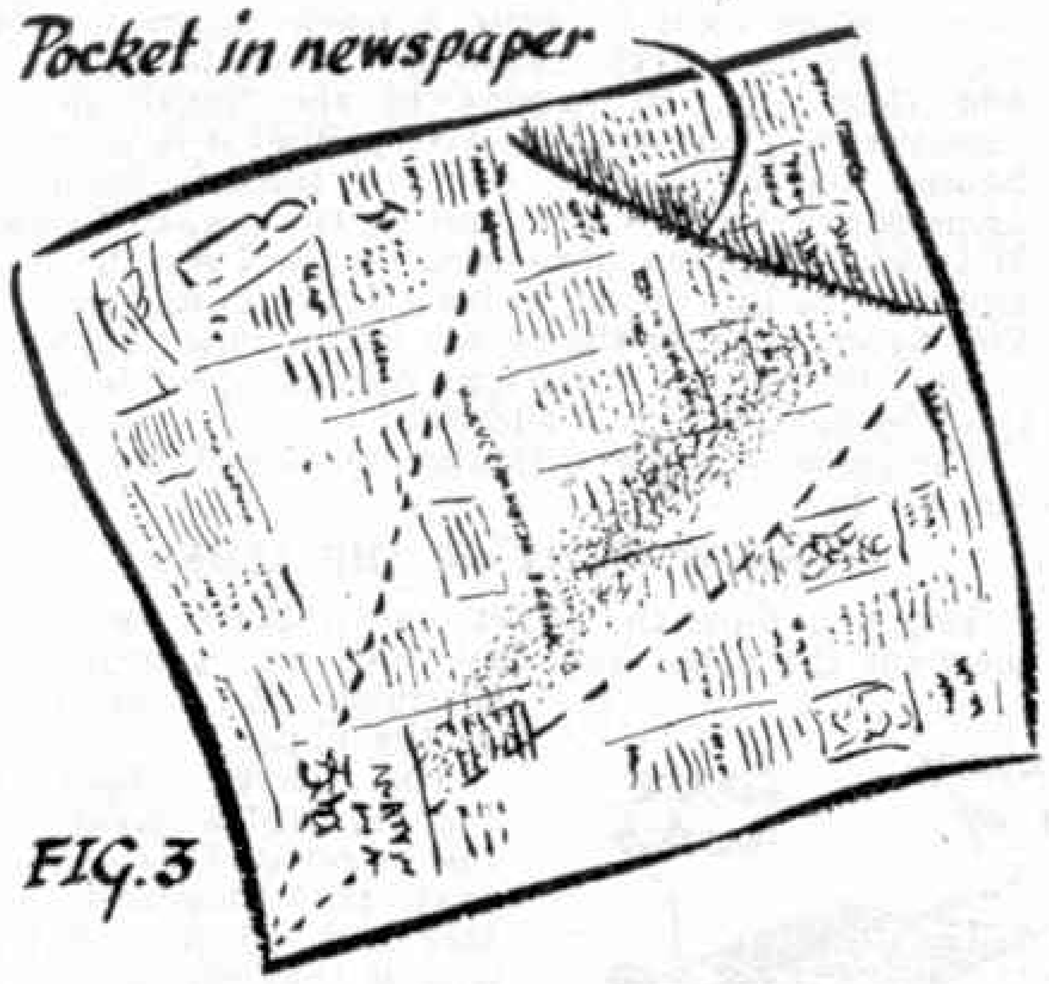


FIG. 3

Having rolled the two visible handkerchiefs together, still keeping the other bundle hidden in your hand, hold the two bundles together as one for a moment, then take the bundle with the cord in it in your left hand, leaving the bundle of two handkerchiefs hidden in your right hand. (See Fig. 2.) Put your right hand into your pocket and take out a small elastic band and leave the concealed bundle behind. Put the band round the visible bundle and drop it into a glass tumbler. You can give this to a spectator to hold and at the end of the trick let him undo it and find the missing cord himself.

The vanish of the cord from the newspaper cone is clearly illustrated in Figs. 3 and 4. Paste two sheets of newspaper together, leaving a V-shaped piece unstuck from corner to corner, as shown. Cut the point off one sheet. When you make up the cone, take care that the cut-off point is on the inside at the top; then when you drop the cord into the cone it goes into the inner pocket and remains concealed when you open out the cone.

At the end of this trick, untie the cord from between the two handkerchiefs

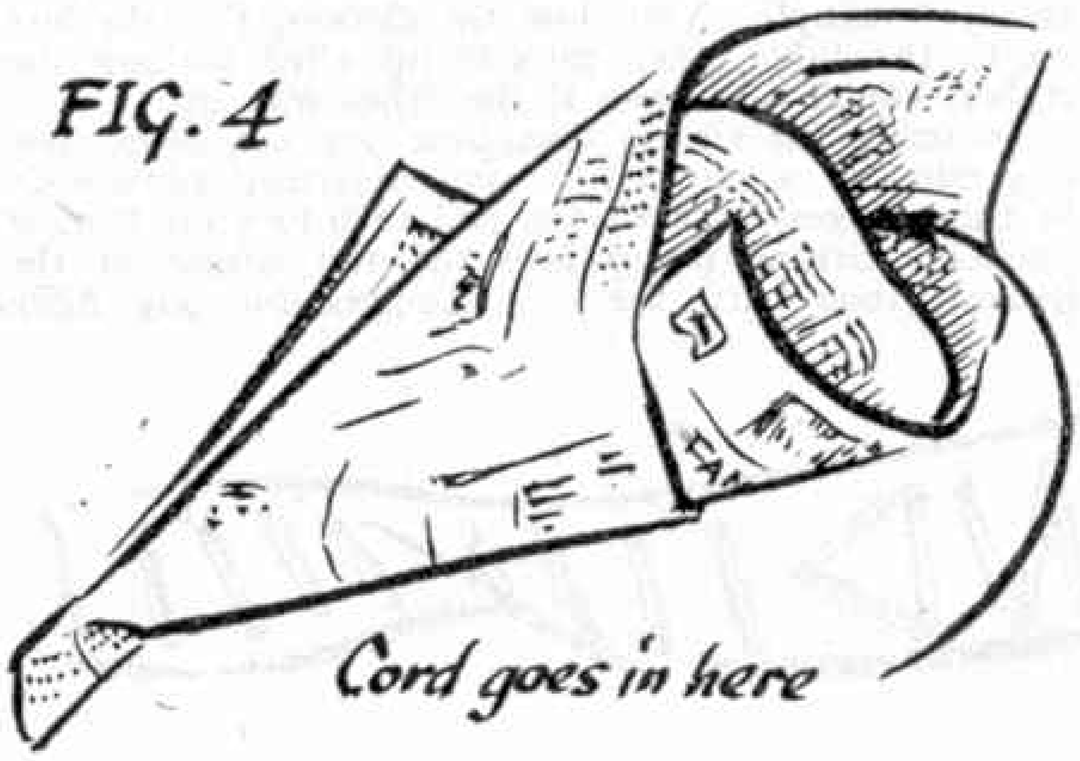


FIG. 4

and use it for

CONJURER'S HOUP-LA

You ask two members of the audience to tie one end of the cord to each of your wrists. You then hand out for examination a ring of paper, consisting of a strip about an inch and a half wide with the two ends gummed together to form an endless band. "The game is to get the ring on the cord without tearing the ring or cutting the cord," you remark. "It doesn't take long—if you're a conjurer." Saying this you walk behind a screen, or out of the door, and return instantly with the ring threaded on the cord between your hands. The cord has to be untied before the ring can be got off.

The Secret. There are two rings of paper, both alike. One of them you have concealed up your sleeve, wearing it on your arm under your coat, like a sort of secret bracelet. Tuck it well up and there is no fear of it falling down. When you go behind your screen, simply put the visible ring into your coat pocket and draw down the duplicate on to the cord. To make the trick effective, be sure to tell your assistants to tie tight knots in the cord.

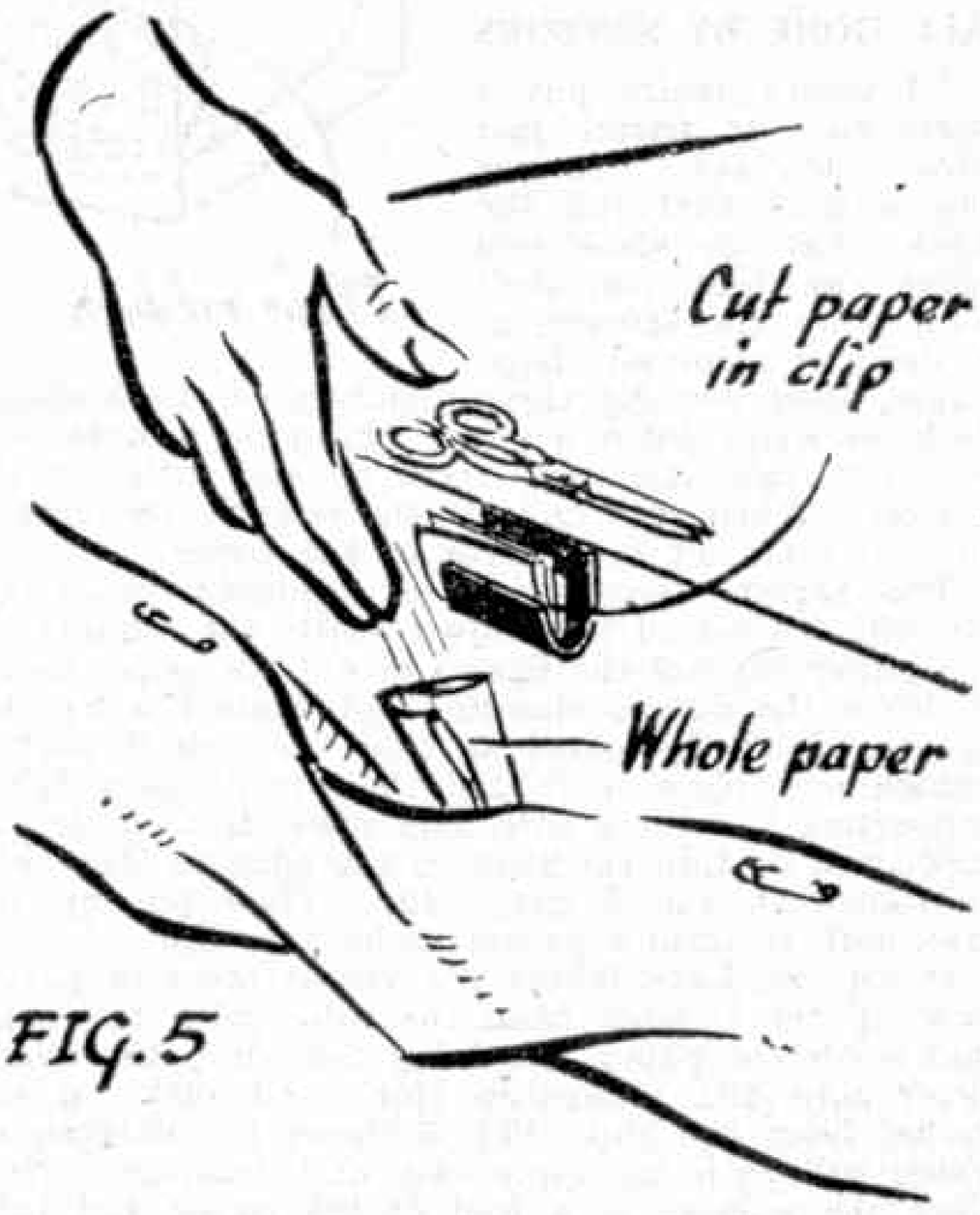


FIG. 5

You must obviously have the cord untied from your wrists before you can do the next trick, and for it you use the paper ring. It is called

THE UNEXPECTED WIZARD

You invite a member of the audience to help you and you give him the paper

band and a pair of scissors, telling him to cut the band in two, cutting lengthwise along the paper. The result is, of course, that he gets two paper bands, each half the width of the first.

"That looks easy," you say. "But now have another go, with this band, while I put an exceedingly crafty spell on you." You hand him another band and while he cuts it you make weird passes at him. The spell evidently takes effect because instead of getting two rings he gets one big one.

"See what a little spell does," you remark. "Now I want you to try again. Stick the scissors into the band and cut it carefully along the middle as before. This time I'll alter the spell."

The result this time is certainly two rings, but they are tied together!

The Secret. This trick literally does itself. The second paper band given to your assistant is prepared by giving one end one twist before sticking the ends together. You will find that cutting the band as described gives the quite unexpected results I have indicated.

After thanking your assistant you proceed to

ALL DONE BY SCISSORS

"I didn't really put a spell on our friend just now," you say. "It was the scissors that did the trick. Let me show you what else they can do." You wrap the scissors in a sheet of coloured tissue paper, then you get three members of the audience each to write down a single figure on a note pad. A fourth spectator adds them up and calls out the answer. When you unwrap the scissors the correct total is seen cut neatly out of the paper.

The Secret. Two pieces of coloured paper are needed. On one of them draw neatly the number 15, and either cut out the figures or cut the paper away, to leave the figures standing out against a cut out square. Fold the paper so that the cutout part is hidden and place it behind the top of your table, supporting it with a little clip made from a piece of cardboard or thin tin fixed to the edge of the table, as shown in Fig. 5 (page 497). Then pin up the tablecloth to form a pocket under the clip.

When you have folded the visible piece of paper, pick up the scissors from the table with the hand that holds the paper. In doing this, drop the folded paper into the pinned-up cloth and pick up the packet from the clip. Fig. 5 shows the movement, which will be found quite easy and deceptive. Now place the scissors in a fold of the paper and take up the note pad. This pad has no cardboard backing and on one side you have written down, one under the other in three different kinds of writing, the figures 7, 3, and 5, which of course add up to 15. You can use any other figures and total you wish, but keep to single figure numbers and let the total be somewhere in the neighbourhood of 15. Do not put the total under the figures.

Now come forward with the plain side of the pad uppermost, your fingers hiding the figures. Ask three people each to write a single figure number, one under the other. Then get a fourth person to add them up. In passing to the fourth person, however, you turn the pad over so that it is your own figures that are added, and the total is bound to agree with your cutout figures on the prepared paper. It is as well, when presenting the pad for the third figure to be put down, to keep your thumb over the first figure, so that the person writing the last figure cannot tot up the total and possibly confound you later by refuting your addition.

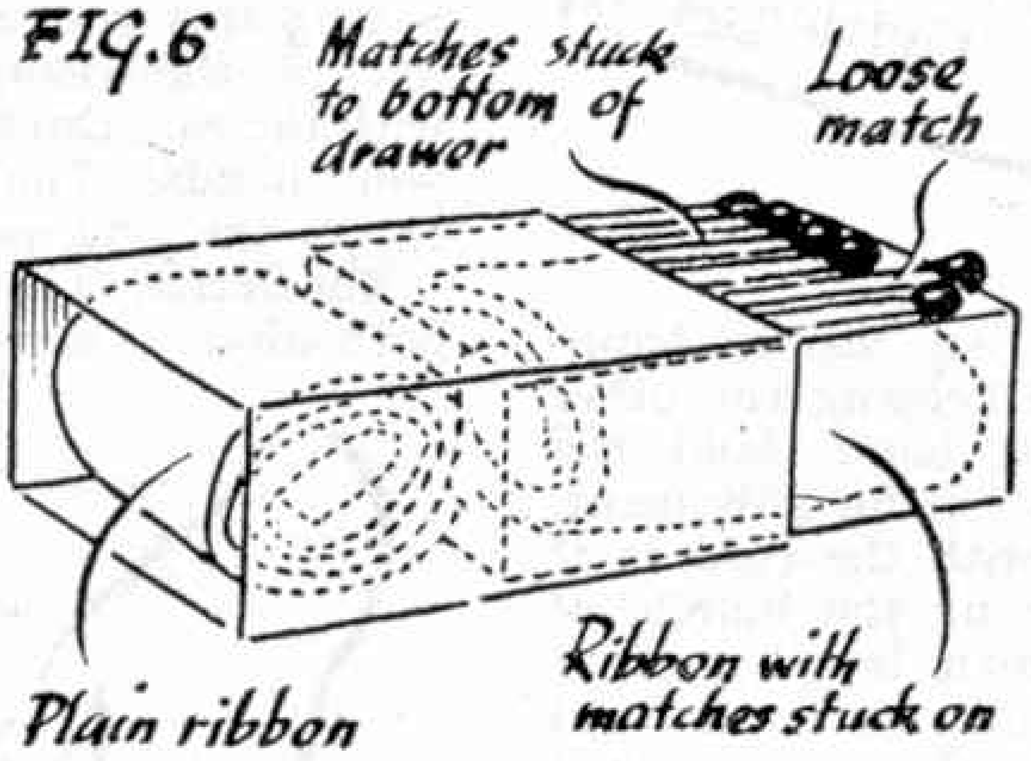
The piece of paper with the cutout number carries you on to

THE MYSTERY OF THE ASHES

Yes, you burn the paper. As it burns away you blow off the ashes and they turn into a long piece of ribbon, the same colour as the paper.

The Secret. Look at Fig. 6, which gives you the secret of this and the next trick together. For this trick all you need to note is that the drawer of the matchbox, from which you take a match to light the paper, is pushed out about half way. In the space so formed in the case is tucked the rolled-up ribbon. Hold paper and matchbox together in your left hand. Strike a match, light the paper and close the matchbox. This forces the ribbon out into your hand. As the paper burns away, scatter the ashes and shake out the ribbon. You show the ribbon carefully on both sides and carry on with

FIG. 6



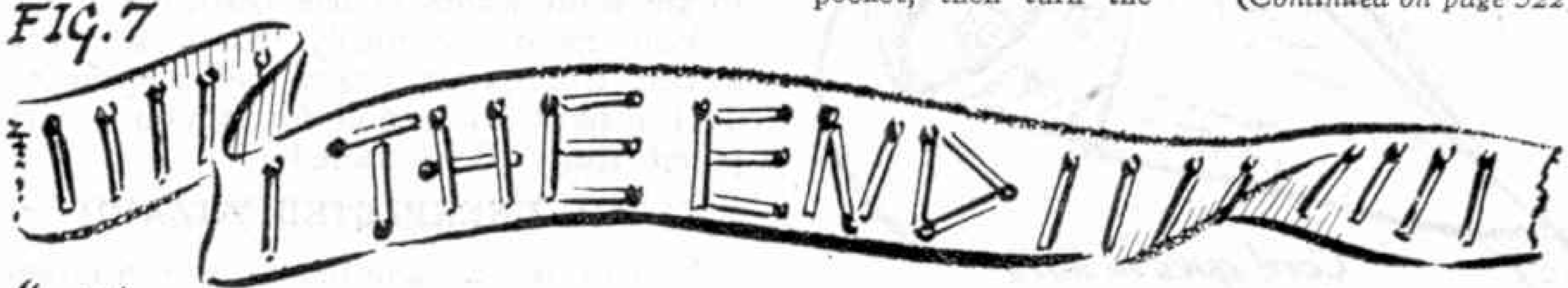
A "MATCHICAL" FINALE

You show that the box is full of matches, close it and toss it on to the table. Then you take the length of ribbon and proceed to make it disappear. Going to the matchbox, you open it. All the matches have vanished and in their place is the missing ribbon. You unroll it and there are the matches, neatly stuck to the ribbon in a row, the centre ones forming the words "THE END." Which of course is what it is.

The Secret. If you look again at Fig. 6 you will see there is something more dishonest about the matchbox. It is upside down. A row of matches is glued to the bottom of the drawer with one match loose. You need the loose one to burn the paper with in the previous trick and that of course gets rid of it. The box appears to be full of matches, but inside the drawer and out of sight at the beginning of the trick is a piece of ribbon exactly the same as the one you have just produced, but with matches glued to it as shown in Fig. 7. The matches can be struck ones of course. The change from a box full of matches to one containing the ribbon is therefore simple. You close the drawer, toss the box on to the table, then pick it up after making the ribbon vanish and open it the other way up.

To make the ribbon disappear you can either use a version of a method I have described previously in these pages, or tuck the ribbon into your trouser pocket, working it up into the top corner of the pocket, then turn the (*Continued on page 522*)

FIG. 7



How the matches are stuck on the ribbon

The pre-war all-Pullman "Brighton Belle," the pride of the Southern Electric service, on its non-stop run between Victoria and Brighton. Photograph by courtesy of the Southern Railway.

Southern Railway Electrification Plans

Abolishing Smoke from London Stations

THE Southern Railway have announced large scale plans for the extension of electrification. Of the 2,156 route miles of track owned by the company, 714 miles, or nearly one-third of the total system, are already electrified, and provide the largest electric suburban service in the world. The new proposals involve the further conversion to electric traction of 284 route miles, and the total cost of the scheme will be £15,000,000.

The area in which this extension of electrification is to be carried out is south east England. When it is completed steam locomotives will be completely eliminated from the lines of the former London, Brighton and South Coast and South Eastern and Chatham Railways. Victoria, London Bridge, Cannon Street and Charing Cross will see no more steam trains, and the "*Kent Coast*," "*Golden Arrow*" and other famous expresses on this section will be hauled electrically.

In Kent the present electrification extends to Gillingham and Sevenoaks. From the former the lines to Margate and Ramsgate and the secondary line from Faversham to Dover by way of Canterbury will come under the new scheme, while from Sevenoaks the Folkestone and Dover, Deal and Ramsgate route via Tonbridge and Ashford will be electrified. The Bexhill and Hastings lines from Tonbridge via Tunbridge Wells also are included in the proposals, together with secondary lines to Haywards Heath and Brighton and others on the flank of the main Brighton line, which has been electrified since 1933. Thus eventually all passenger trains and the principal freight trains in the counties of Kent, Surrey and Sussex will be worked electrically. Only feeder services and local goods trains will be excluded from electric haulage, and even these will not be dealt with by steam locomotives, for diesel-electric engines are to be introduced.

It will be seen that this involves a very great change in haulage methods. To-day the S.R. owns over 1,800 steam locomotives, but when the proposed conversion is completed the number will be reduced to less than 800. While one may regret the passing of the traditional steam locomotive in this wide area, the advantages of the scheme must be recognised. The S.R. electrification already undertaken saves 400,000 tons of coal a year, and the new proposals for further electrification and the adoption of diesel traction will bring about a further saving of 300,000 tons a year. A further advantage is the elimination of smoke from the busy lines radiating southward and south eastward from London and from the four great London termini affected.

As the principal freight trains are to be worked electrically, the two more or less experimental electric locomotives already in service on the S.R. will no doubt be developed further. These box-like but efficient engines can haul 1,000-ton freight trains and have a maximum speed of 75 m.p.h. With diesel traction proposed for feeder services and local goods trains, it will be interesting to see how the type of unit at present represented on the S.R. by three diesel shunters is developed. About 200 diesel-electric engines will be required.

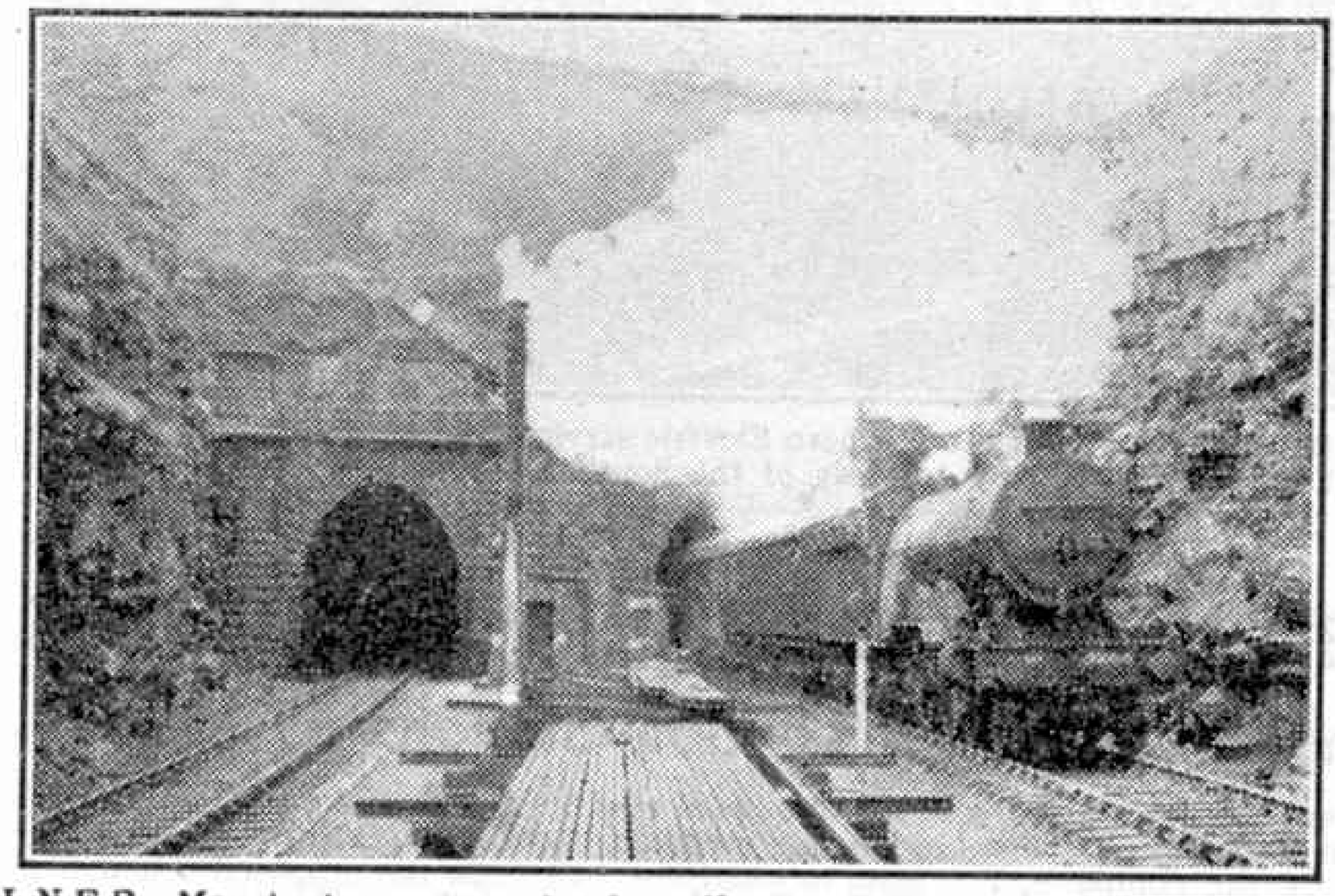
It is hoped that the work will be completed by 1955. The scheme has been carefully planned after a considerable research, in the course of which S.R. officers visited Switzerland and the United States in order to study the latest developments in electrification and diesel traction. As a result of the introduction of the scheme the people of the south east will enjoy speedier and more frequent train services, with the additional advantage of the elimination of smoke, and visitors from the Continent arriving at the main Channel ports will be met by clean and comfortable electric trains of the most modern design.

Railway Notes

New L.M.S. Locomotives and Coaches

The L.M.S. announce that during the four-weekly period ending on 5th October last the following new locomotives were placed in service and allocated to the sheds named: 4–6–2, class "7P," No. 6253 "*City of St. Albans*" and No. 6254 "*City of Stoke-on-Trent*," the latter of which was illustrated in last month's "*M.M.*," both to 1B Camden, London; class "5" 4–6–0 mixed traffic, built at Horwich for the Midland Division, Nos. 4982–3 to 20A, Leeds; No. 4984 to 14B, Kentish Town; No. 4985 to 17A, Derby. New class "4P" 2–6–4Ts were Nos. 2241–5, built at Derby and shedded at 27A, Polmadie, Glasgow.

Although the centre corridor vestibuled type of main line coach is now found to a considerable extent in the make-up of L.M.S. trains, the compartment type of coach with side corridor still finds considerable favour. Of these 200 are under construction at Derby with end doors, spacious gangways, seven third-class compartments and toilet at each end. There are arm rests for the use of centre passengers when travelling three a side, double sliding doors to the corridor, and good lighting and ventilation, while care has been taken in the design to exclude draughts. There are five electric lights in each compartment and special attention has been paid to the design of the comfortably sprung upholstered seating. The vehicles are carried on eight wheels and weigh 30 tons 14 cwt. empty. They are good examples of the latest British standards of passenger comfort.



L.N.E.R. Manchester express leaving Woodhead Tunnel. Photograph by H. C. Casserley.

Telephones on Trains

The L.N.E.R. have experimentally equipped the Leeds portion of the 8.55 a.m. train from King's Cross to Leeds and Bradford with a telephone enabling the engine crew and guard to talk to each other en route. The telephones both on the engine and in the guard's brake are provided with special hand sets for speaking and loudspeakers for receiving a buzzer call when a press button is operated at the calling end. No valve amplifiers are employed, the microphones being of a special type using much heavier current than is required for an ordinary telephone, to provide adequate volume of sound for noisy situations.

The equipment has been manufactured by Clifford and Snell Ltd. and is similar to this firm's "Loudaphone" telephones, which are extensively in use on L.P.T.B. trains.

Speedier Renewal of Permanent Way

There is much leeway to make up in the way of renewing sections of track that have been subject to heavy wear and tear during the war, and there are many slowings necessary at the present time over sections of line which are to be, or have been relaid with fresh rails and ballast.

While actual relaying work is in progress the tracks involved are completely out of use, and it is therefore of immense advantage in many ways to complete such work in the shortest possible time. Mechanisation has been brought into play in many ways to assist that end, as already described in our pages. The S.R. are establishing a number of main permanent way depots in Kent, Surrey, Sussex, Hampshire and Devonshire, where complete sets of new track, ready on chairs and sleepers, will be assembled in readiness to fit exactly into the sections requiring renewal. Steam cranes are used to lift the 60-ft. or other lengths into position, dealing also with old rails and other heavy material. Half a mile or so can be completely relaid in this way during the quiet hours of the night if necessary, and there is much less tidying up to be done afterwards by hand.

Great Western Tidings

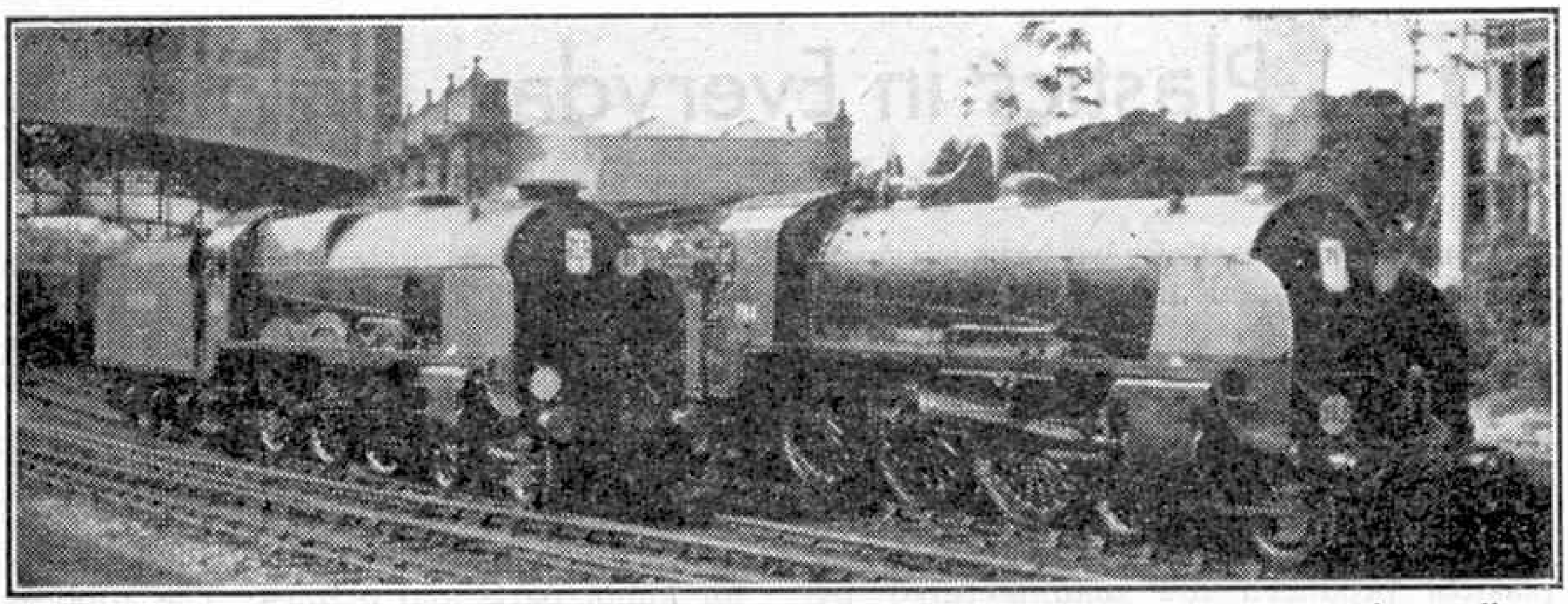
What may possibly lead to a revolution in locomotive propulsion methods is the decision of the G.W.R. to place an order with Brown-Boveri Ltd. for a gas turbine locomotive for experimental use on express passenger trains. The very high standards of performance stipulated for include an output of 2,500 h.p. and a maximum speed of 90 m.p.h.

The reason for re-numbering 4–4–0 engines hitherto 32xx to 90xx is revealed by the appearance of the first of a fresh 0–6–0 series of goods tender engines carrying the numbers 3200–8, following on those of the "2251" class, to which they are similar. More new 2–6–2Ts of the "5100" class are Nos. 4143–9. No. 77151 and other "Austerity" 2–8–0 freight locomotives are on loan from the Ministry of Supply. No. 1016, a 4–6–0, has been named "*County of Hants*"; No. 6945 of the "Hall" class carries the name "*Glasfryn Hall.*"

In order that engines converted for burning oil fuel may be readily distinguished from those in their main group not so fitted, the numbers of the converted locomotives are to be altered. Thus oil-burning "Halls" now in the 49xx or 59xx series will become 39xx; 2–8–0s of the 28xx or 38xx groups will be re-numbered 48xx in present order. Present 48xx 0–4–2Ts will be allocated numbers in the 14xx group. No. 5091 "*Cleeve Abbey*," "Castle" class, is running as an oil-burner.

New standard 64 ft. coaches have many novel features, including fluorescent lighting.

The headquarters of the G.W.R. mechanical and electrical signalling, telecommunications, automatic train control installation and time recording systems are situated at Reading, at the Signal Works originally established in 1855. The whole of these premises are to be rebuilt into a fine, modern building that will be the largest of its kind in Britain. The Signal Department is responsible for the maintenance of some £14,000,000 worth of equipment located in the triangle Paddington-Penzance-Birkenhead, including for example 27,000 telephones, 28,000 signals, 1,843 signal boxes and 65,000 miles of wires.



"Lord Nelson" and "King Arthur" 4-6-0s ready to haul S.R. Bournemouth-Waterloo expresses, in new livery. Photograph by D. L. Bradley.

A Fast Run on the G.W.R.

Faster timings than during the war are now in force for many main line trains, but slow running is often necessary at various points where permanent way repair slacks are in force. Commendable efforts are being made by some drivers, when circumstances permit, to recover time so lost and thus effect punctual arrivals.

More than this was accomplished recently when the 1.15 p.m. Bristol express from Paddington, logged by Mr. O. S. Nock, was hauled by No. 5028 "*Llantilio Castle*" with a full load of 365 tons. Two slowings were suffered in the first 11 miles, so that it took over 22½ min. to pass West Drayton, 13¼ miles out. Speed rose gradually on the level thereafter, being as much as 72 through Reading, 36 miles in 44½ min. Time gaining continued, and a steady 70 m.p.h. or so was being maintained after Goring troughs when on went the brakes again, to effect a reduction to 30 on account of repair work at Cholsey Station. Subsequent fine acceleration gave speeds of 66–67 all the way up the slight ascent towards Swindon, 77¼ miles, passed in 85 min. After a maximum of 75 down the 1 in 100 beyond Wootton Bassett, the engine was worked easily but gave a smart run in to the first stop at Bath, where the arrival was a good 2 min. early despite 9½ min. lost by repair slacks, so that an unchecked run on that spirited basis would have occupied only about 103¼min. for 107 miles, a net average of well over a mile a minute.

Woodhead Tunnel and L.N.E.R. Engine No. 3284

In our issue for April 1946, in connection with the Manchester-Sheffield centenary, we gave some details of the Woodhead Tunnel, which pierces the Pennine and moorland region on what is now the Great Central section of the L.N.E.R. The tunnel has a length of just over three miles and a gradient of 1 in 201, and its eastern portal is at an altitude of 943 ft. above sea level. There are long, steep climbs to the tunnel on each side.

In "*Railway Notes*" of last June mention was made of the withdrawal of Ivatt "Atlantic" No. 3284, which once made a record run from Leeds to King's Cross with the "*Queen of Scots Pullman*" when the whole of an 18 min. late start was recovered; the whole trip of 185¾ miles was made in 175 min., and 70 m.p.h. was averaged for well over 100 miles with 295 tons, although the engine was 29 years old. We now have pleasure in reproducing a photograph of No. 3284 leaving Woodhead Tunnel, the longest on the L.N.E.R.

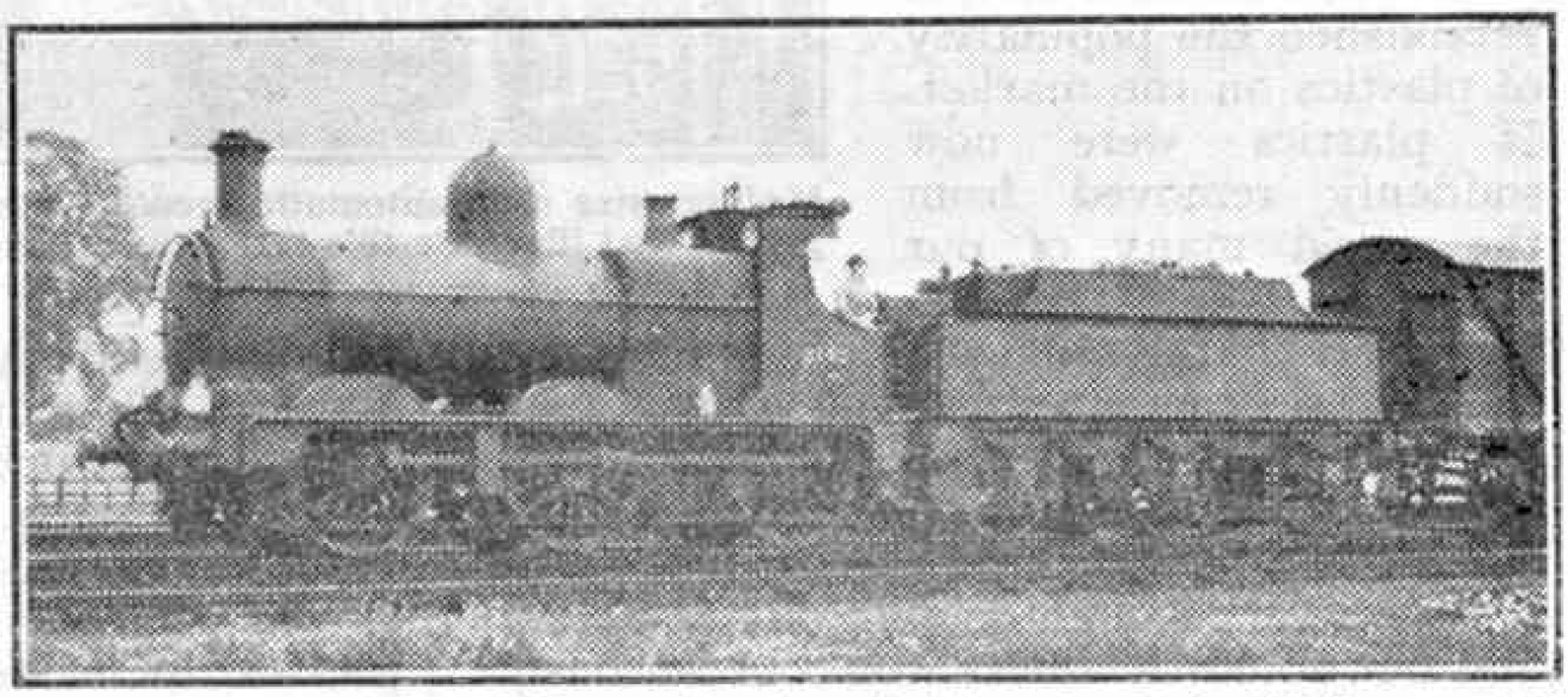
A New Railway to a Holiday Camp

Quite a notable event in the East Riding of Yorkshire has been the building during the past summer of a new double track railway to serve Butlin's Holiday Camp at Filey, a pretty coast spot. It is really two short railways forming a "Y" junction with the L.N.E.R. Hull-Scarborough line enabling through running from either direction into a new four-platform station which will have direct road and subway access to the holiday camp. The total length of new branch lines is just over one mile.

A heavy Pullman car special train conveying a whole opera company as well as other passengers recently ran from King's Cross to Filey, being hauled from London by rebuilt "A3" green 4–6–2 No. 107 "*Royal Lancer*," formerly No. 4476. It thus was a precursor of the re-introduction of regular "*Yorkshire Pullman*" express services, which took place on 4th November last.

Train Name Headboards Reappear

Although not yet a usual practice, it was a pre-war feature, especially on the L.N.E.R., for the locomotives hauling certain famous expresses, including the streamline services, to carry headboards bearing the train's name, such as "*Flying Scotsman*," "*East Anglian*," "*Yorkshire Pullman*," "*Silver Jubilee*," "*Coronation*" and so on. It is pleasing to record that the first three boards have re-appeared in conjunction with the improved winter services, and that on the S.R. "*Bournemouth Belle*" headboards have appeared in addition to the insignia of the "*Golden Arrow*."



G.W.R. Dean 0-6-0 No. 2442, one of a class that has given splendid Government service in two world wars.

Plastics in Everyday Life

IV—Things That Can Be Made

IN our previous articles we have surveyed briefly the organic chemistry with which plastics are directly concerned, the materials used for their manufacture, and some of the processes used for the production of plastic articles.

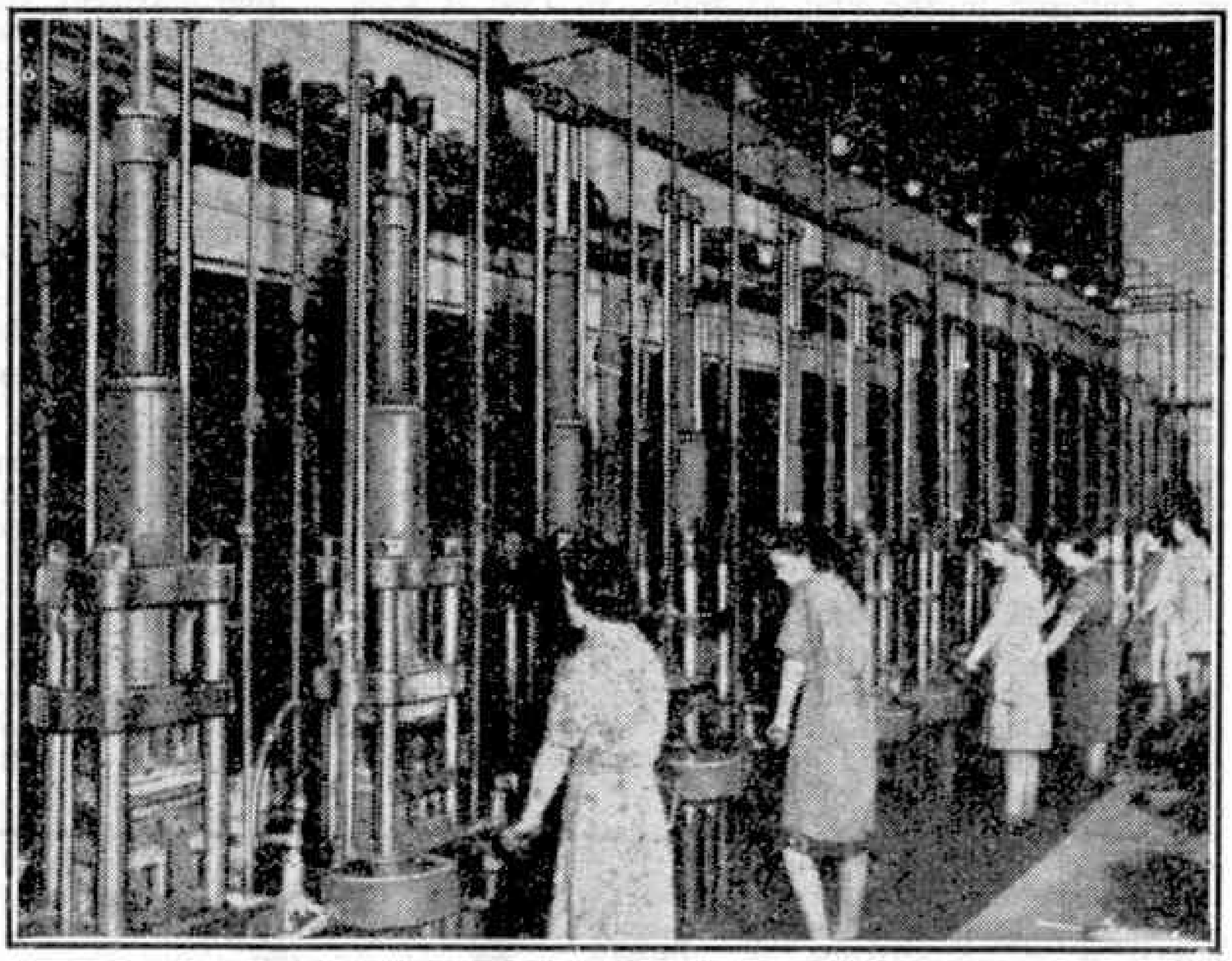
We have considered the various methods of constructing and using moulds in presses, but only a small proportion of the plastics produced are manufactured by those processes. Therefore a bare account of the things that can be moulded would be entirely inadequate to cover the whole range of these interesting materials.

Let us consider plastics then in their relation to a problem which is very close to the personal lives of us all—the rebuilding of our homes and cities. What part can plastics take in this work of reconstruction? We will discuss plastics in this light as far as space will permit, and in so doing we will cover as nearly as possible the whole range of plastic products used in industry and everyday life.

The first plastic articles manufactured for public use were the "Bakelites," during the Great War. They were dark, unattractive materials, but by the late twenties urea-formaldehyde plastics with their bright colours and transparency made an appearance on the market. These earlier amino-plastics were known as "Beetle" and "Polopas" products, and their arrival established the popularity of plastics on the market. If plastics were now suddenly removed from the world many of our activities would be immediately paralysed. Aircraft would not fly, electric current would no longer flow, all motor-cars would stop, wireless would be silenced, and even parts of our clothing would be affected. Further, many types of machinery would be put out of action and our domestic affairs would be seriously disorganised.

Plastics may be valued by their ability to replace other materials; in some cases carrying out the duties better and more cheaply than those materials. New effects and functions are possible, due to the plastic characteristics.

The use of reinforced resin materials for building and fitment constructional purposes is an attractive possibility. A number of organic products seem suitable for minor parts and fittings. The application of these to general architectural purposes is under consideration by the plastics industry, and some are already in demand. Certain plastics, best suited for structural work, have tensile and compressive strengths in ratio to their weights, as high as those of steel and duralumin, but owing to the non-ductility of the materials it is difficult to produce efficient bolting or jointing by the usual methods, since the localisation of the stresses cannot be eased by any flow of the plastic material when it is under load.



Medium size semi-automatic presses with female operators. The photographs that illustrate this article were taken at the Elo Works of Birkbys Ltd., Liversedge, Yorks.

For constructional members we may either use parts moulded to the required shape, bars or sheets, machined by hand as for metals. The cost of moulds and presses increases very rapidly with the size of the parts required; therefore it is only economical to use small mouldings

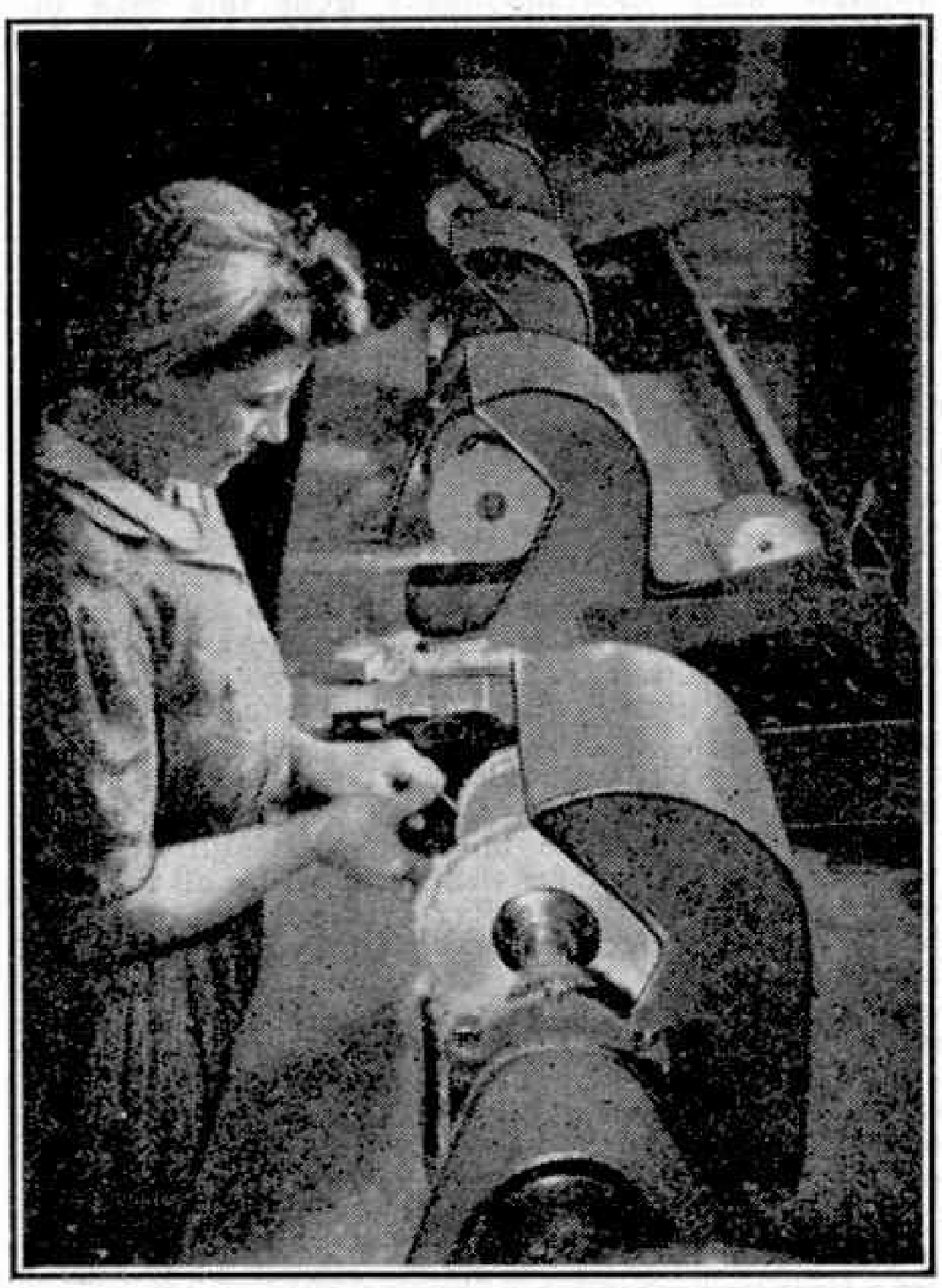
for standardized parts. Larger structural members may be built up by bolting or gluing. The bolting requires heavy additional reinforcement, and a really strong glue must be developed to produce efficient joints; which indicates that these materials will, for the time being, be confined to use for fitments and lightly stressed parts only.

In the previous articles the impregnation by resins was mentioned. It is this process that is opening the field of structural work to plastic materials. The process entails—instead of the normal mixing of fillers of a fibrous or powdered nature with the resin—an almost reverse procedure that is the forcing of the resin into organic absorbent materials such as wood, paper and fabrics. This results in a type of material unobtainable by moulding processes, and which will become the basic type of material for constructional purposes. It has been claimed that resin-impregnated soft-woods are harder than teak or ebony.

Impregnation of green timber is carried out in the following way. The resin, usually a phenolic one, in solution form is forced through the lower end of a log by a special machine. The sap, containing elements which are harmful to the timber, is forced out of the other end of the log, until this is fully impregnated by the resin. By this method all the cells and cell walls are completely filled by the resin and the log can then be dried in a kiln in a relatively short space of time, leaving the required moisture content. A retarder may be added to the resin to allow for long curing, so that the wood may be worked upon by the machinery or craftsmen while it is still comparatively soft. The impregnated log may be sawn up and used as ordinary hard wood.

This process has a special value for naval work owing to its extra strength over other home-produced woods. It can be used in thinner sections than ordinary timber, thereby taking up less room; and it is claimed to be almost fireproof and to have a long life owing to its resistance to wear, splintering, dry rot, insects, grease and chemical action; laminated and veneered woods made up from impregnated timbers are claimed to be far stronger than normal plywood of the same thickness.

Textiles, too, may be treated with formaldehyde resins to make them crease-proof. It has been found that cotton, linen, and artificial silk crumple easily, owing to the relative plasticity of the fibres. Treatment with synthetic resins



Mopping or polishing.

assists the resistance of these materials to creasing without losing their other qualities. Cellulose threads are also strengthened and enabled to resist stretching and distortion in the same way.

A strong fabric-based plastic is obtained by soaking cotton flock in an emulsion of water with a thermosetting resin chosen for suitable properties. When the water is driven off the resultant felt-like mass is pressed into sheet form and dried. This material is reputed to have several times the strength of other thermosetting plastics and is in use for stressed parts in light structure.

Continuous bands of paper or fabric are passed through a bath of solution. The solvent is then driven off and the material is cut into convenient size sheets. These sheets are used separately, or pressed together under the influence of heat into solid blocks from which any desired shape may be machined. It is from this type of material that plastic gears are cut, and found to be highly resistant to shock, silent acting and long lived.

The freshly resin-coated paper may be wound on mandrils and dried to produce tubing able to resist water and chemical action. Laminated blocks formed from impregnated fabrics are very strong, and are used for bearings which withstand

abrasive wear. Bearings made from this type of material have withstood heavy duty for long periods on the German State Railways in the effort by that country to save metal.

Such materials as these may eventually replace metal and timber parts in buildings, and by their use save considerable weight, space and expense.

Phenolic resins were first used as bonding agents for plywood about the year 1930, and these in use are waterproof, highly resistant to bacterial attack, and easily bent after steaming. Under test it has been found that the adhesives will remain insoluble even after the wood has decayed. It is possible to mould the resin-bonded plywood into a range of shapes, by use of dies, and by reinforcing the plywood with cross layers of fabric and thin veneers. This produces strong and durable curved forms. The edges of the ply are sealed under pressure, using heat-reactive resins applied in liquid form and pressed out under heated rollers. High strength plies are produced by using resin-impregnated ply sheets bonded with plastic glues and hot pressed. Proof of the strength of these laminated resin-impregnated and bonded plies is provided by the air-screws made up from them.

The ability of these plies to withstand adverse weather conditions makes them suitable for all manner of external work in the form of wall and weather boards. The surfaces may be finished with fabric, and impregnated with water-resistant and fire-resistant resins. These provide a good base for paint or wallpaper, rendering plaster unnecessary.

Resistance to the action of fire by plywoods can be carried out in various ways, although it is true that no woods can truly resist combustion since they are organic materials and must consequently carbonise under the influence of heat. The plies can be so arranged that the laminations retard the evolution of inflammable gases. The edges of the laminated boards will char, but not readily burn. A further precaution against fire may be taken by impregnating anti-pyrene salts, which do not support combustion, into the plies before gluing up.

Resin adhesives may also be used for combining asbestos and metal in composite boards to form fire resisting sheets.

Veneers of urea or phenolic resin sheets may be glued on to resin-bonded plies. Panels made from these veneers have hard surfaces which are reasonably stretch-proof and can be made blister-proof by including a backing metal foil behind the decorative surface. These surfaces may be used where hard-wearing qualities are required combined with a decorative treatment as in bathrooms, kitchens, school-rooms, etc.

Laminated blocks made up of resin-impregnated sheets of wood are pressed together under heat, with fabric reinforcement as required, and used for bench tops, kicking plates, skirtings, chair treads, nosings, inlaid and block flooring and many types of furniture fitments.

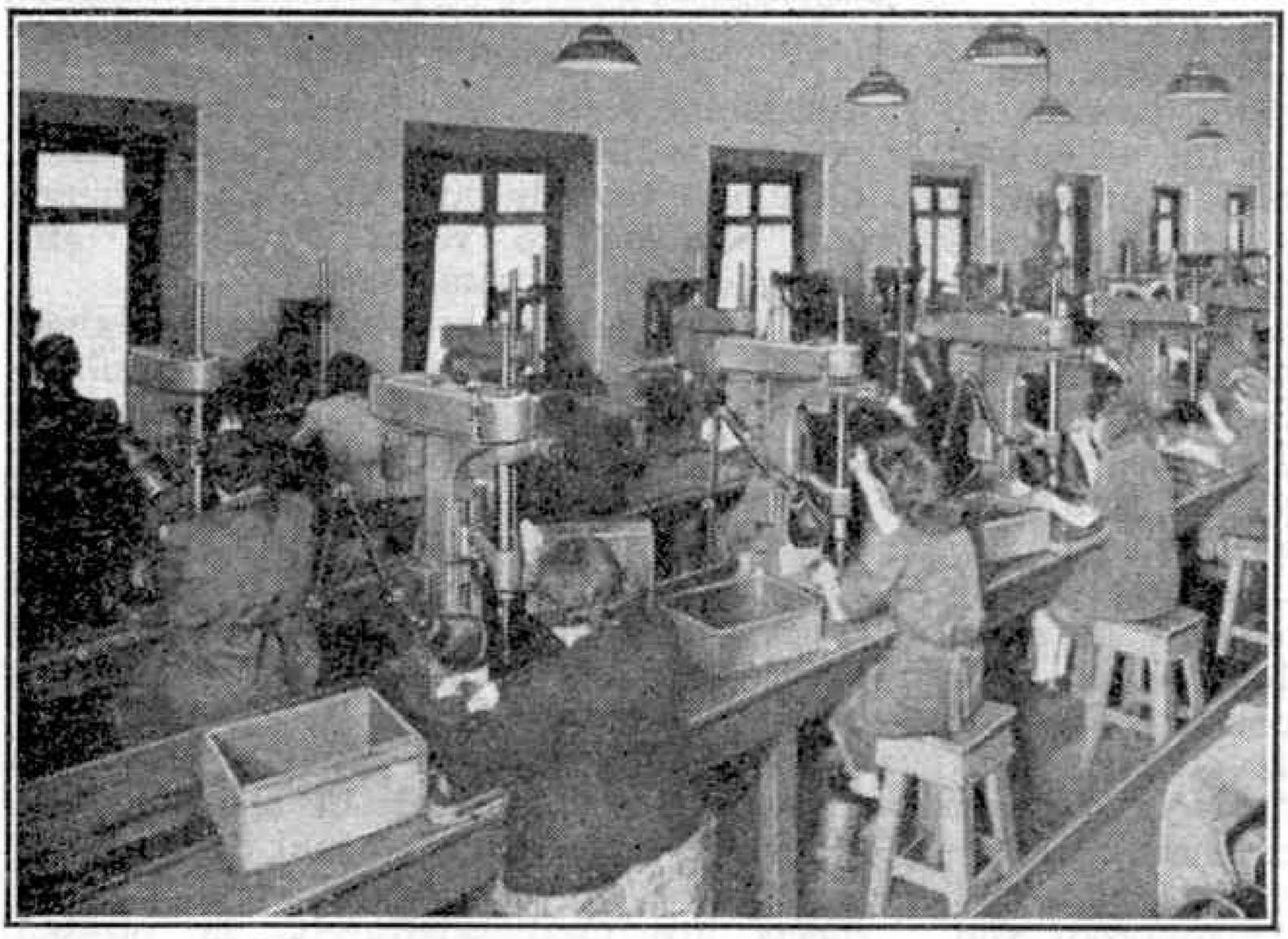
Until some twenty years ago paints, varnishes and lacquers have had the same derivations from the time of the early Egyptians, in flax seed oil and fossil resins. Since the introduction of mass-production quick-process requirements, speedier acting coatings have successfully been evolved by plastic research chemists. One of the great assets of plastic materials is that no painting is required either to protect them from adverse conditions or to beautify them by colouring or glazing. The freshness and clarity of colour remains fast for the full life of the material.

As plastics have such abilities, paints, enamels and varnishes have been evolved from them for application upon the surface of other materials for protection and decoration. It has been found that the use of phenolic resin in paints and varnishes produces high water resistance compared with other coatings. Phenolic baking coats suitable for outdoor use resist sea and fresh water, sunlight, temperature changes, solvents, chemicals, sterilisation and perspiration, and form good electrical insulators. Such coats are used chiefly in motor-car manufacture, and on builders' hardware, metal doors, canopy fittings, steel frames, metal balustrading, escutcheon plates, etc. The finishes may be anything from bright colours to a dull matt. They are claimed to have a long life under test. Further uses are found as linings of storage tanks, beer vats, petrol and oil tankers and wagons and containers for other corrosive liquids and solids. The application of these coatings is not confined to ferrous metals; they may also be used on non-ferrous metals and many other materials such as wood, paper and textiles.

Considering the general uses of plastics in structural work—at the present stage of development—only the very lightest structures are possible, owing to the size, expense and strength of the parts required for larger structures; and it is improbable that existing materials such as timber, brick, steel and ferro-concrete will be commercially superseded by plastic structures on a large scale.

Much consideration has been given to the part which prefabrication can play in our rehousing schemes. The Americans have used simplified units, made up in factories in the form of resin-impregnated timber wallboards, insulated and weathered. Such units may be large enough to cover part of one side of a room, or the whole of one side of a house. Many of the fixtures required in the finished building such as the plumbing, light fittings, wash basins, baths, built-in fitments, etc., can be incorporated in the design of these units, and special joints arranged for easy assembly on the site of the various sections of the building.

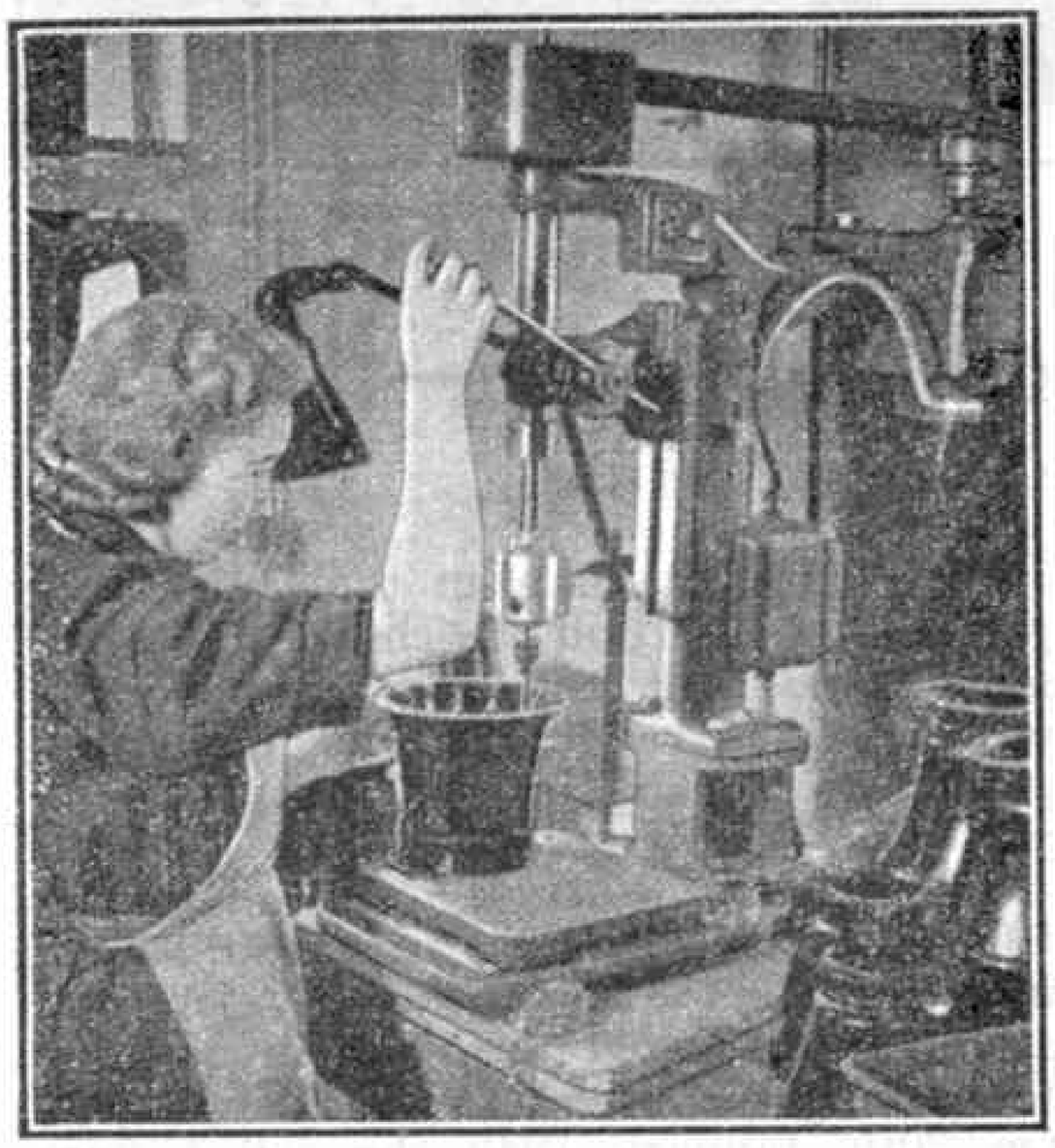
The external renderings of buildings may be made up of a plastic facing material which may be applied



Drilling and tapping section of finishing department.

in the form of a putty. Unlike cement or similar renderings which crack and flake off, specially in seaside localities, this material would remain impervious to water penetration and chemical attack. The setting of the material can be adjusted to the required time by the chemical accelerators. The slightly plastic character of the finished rendering would resist cracking due to any movement of the backing materials.

The hundred and one smaller items required in the completion of a building, beyond the main building materials, may in many cases be constructed



Tapping Screw Threads.

of plastic materials. Plastic roofing tiles, for instance, of a resinous nature, under the trade name of "Mipolan," are claimed to be non-inflammable, and are lighter in weight than ordinary tiling, thus saving structural members.

Further uses for plastic tiling may be found for interior, protective, and decorative functions. Such tiles would naturally have a different character from externally used tiles, and would be suitable for such duties as well as tiles in kitchens and bathrooms, especially near, but not close to sources of heat, and as splashback surrounds for sinks and basins.

An important aspect in the favour of plastic tiles is that the material is less chilly to the touch than marble, glass, stone or earthenware, and combined with its ability to withstand heat and chemicals, is more suitable than those materials for bench tops, bars, flooring and walling materials in hospitals, laboratories, restaurants, nurseries, schools, and many other establishments.

Considering plastics for the use of windows in buildings, it is claimed that certain transparent plastics admit much more light than glass and also allow ultra-violet rays to pass through, which ordinary glass does not. The consideration which withholds plastic glass from the ordinary householder is the price. However, the war has considerably increased the output of such products as Perspex, distrene and polystyrene, to such an extent that Perspex, at least, has even reduced its price since the beginning of the war, contrary to the general run of purchase price adjustments. One difficulty which the chemists are striving to overcome must be surmounted before organic glass can be used successfully. Despite the toughness of the material, it is comparatively soft and fairly easily scratched. The finer scratches are removable by brisk polishing, but in domestic buildings a glazing material must be able to withstand more than light scratches.

Glass and plastics have been combined together by a firm in the United States to form a new safety glass, claimed to be highly resistant to shock and splintering. Two sheets of hardened glass plate are sealed together with a plastic joint, leaving a margin of the same plastic around the edge of the sheet. The edge strip has the same thickness as the finished compound sheet, and may be nailed, bolted, screwed, or pressed for the purpose of fixing one sheet into any frame. This resin-bonded safety glass is calculated to have ten times the strength of ordinary safety glass.

Reference has already been made to the use of fabrics in the manufacture of reinforced plastic materials. Thermo-setting plastics, moulded with shredded and woven fabrics, produce the strongest type of resinous compound, the tensile strength of which renders it a suitable material even for the production of such articles as gear wheels, which are silent in operation and have equal strength, weight for weight, to steel gears.

By such methods of manufacture the visible character of the fabric is lost in the resultant material. In interior decoration and furnishings, however, fabrics are necessary in their own characteristic forms. Fine artificial silk threads may be woven into delicate fabrics for household linen and decorative work. Although it is admitted that artificial fabrics are uncomfortable for use as clothing, owing to the lack of air spaces for easy temperature adjustments in the fabric, it is this ability to resist sudden temperature changes that gives this material insulating properties in addition to its decorative powers. The artificial fabric may also be more compactly woven, using a still thicker plastic thread, and thereby producing a stiff material which may be used as stiff sheets mouldable into many varied shapes.

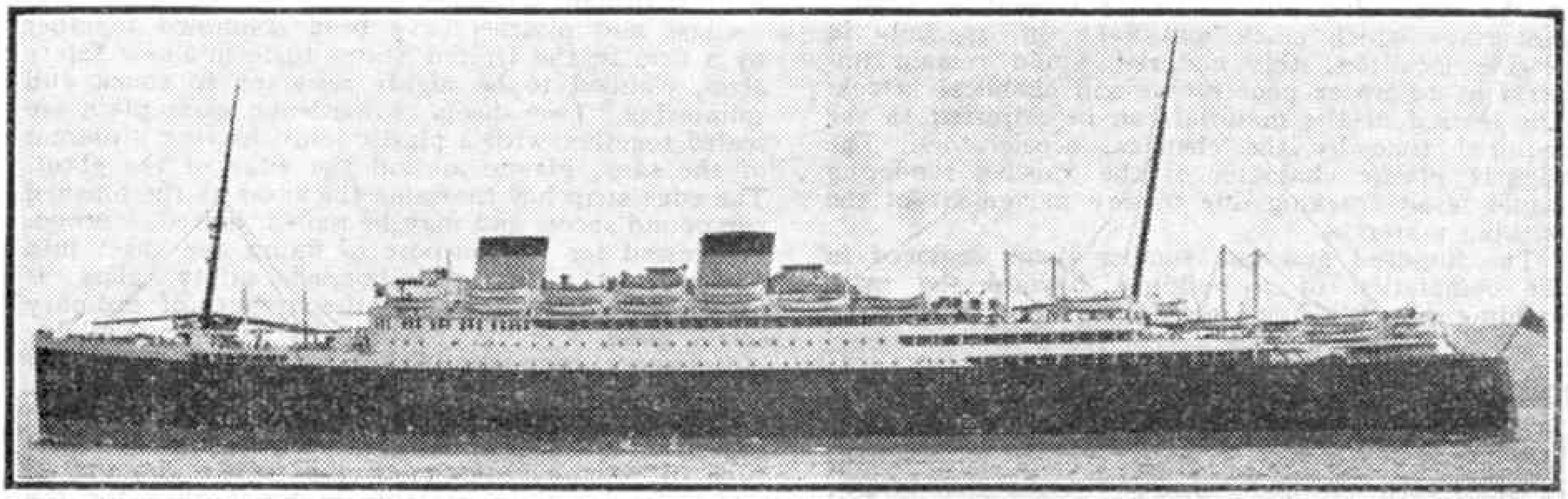
One of the most important of the specialised building uses for plastics is found in hospitals. By using plastics for walling and furnishings, the architect can be certain of a non-porous material with no cracks, crevices, or joints to harbour germs and infection. The surfaces are smooth and can be quickly washed down with sterilisers, without risk of injury to the plastic. Plastic floors, walls and furnishings, with chemical, heat proof, and fire-resisting abilities, will stand up to the wear and tear of hospital use with more safety for the patients than rubber, wood or plaster finishes.

In some exhibition work various parts of the displays, normally opaque, are constructed of a transparent sheet of plastics so that the observer may see the inner working parts. The example in mind is that of an exhibition motor-car, part of the engine and body being made of glass and plastics, giving a clear view of the internal mechanism.

Many precautions have to be taken in industrial works, both for the protection of the workers and the articles manufactured. It is often necessary to have transparent screens over working parts of machinery, to collect thrown-off lubricants and to protect the operator. Glass is unsuitable, as it would crack under heat and vibration, whereas the worst conditions would only cause distortion to a plastic sheet, and vibration would have little effect if the parts were properly fixed. Glass also can be highly dangerous to personnel should it be struck by fragments from a machine. If it is likely that metal fragments will be thrown from a machine, the plastic transparent sheet may be reinforced with a wire mesh.

It was early in the 1920s that plastics had their first big impetus caused by the boom in the production of wireless sets. Orders were placed for millions of parts and tons of raw materials. The next advance was given by the demand for plastics in the electrical systems of motor-cars. In many cases plastic parts cost now only one-third to one-quarter of the original prices, indicating the improved methods of manufacture.

It is interesting to note here that the sizes of plastic mouldings are theoretically unlimited. However, using high pressures (*Continued on page 522*)



M.V. "Georgic" before being bombed

Ship Repair and Salvage—III

By Denis Rebbeck, M.A., B.Litt., M.Inst.N.A., M.I.Mar.E

THE reconstructed Cunard-White Star liner *"Georgic"* provides a classic example of modern "ship surgery." On the outbreak of war the *"Georgic,"* which was then engaged on the North Atlantic service, was taken over by the Ministry of War Transport for transport work. While thus employed she was attacked and set on fire by enemy aircraft in Suez Roads on 14th July 1941. The ship burned fiercely and was eventually abandoned on a reef with 18 ft. of water in her engine room and holds.

Some days later divers went down to plug all openings in the hull below water, close any ports that might be open, and generally make the hull as near watertight as possible. Then pumps from the salvage steamer were put on board and set to work; pumping continued without interruption for nearly three weeks, care being exercised to pump out the various compartments in proper sequence so as to avoid additional strain to the hull or cause any other damage. On 27th October 1941 the ship was floated—an inert mass of twisted steel, "dead" machinery and tons of debris.

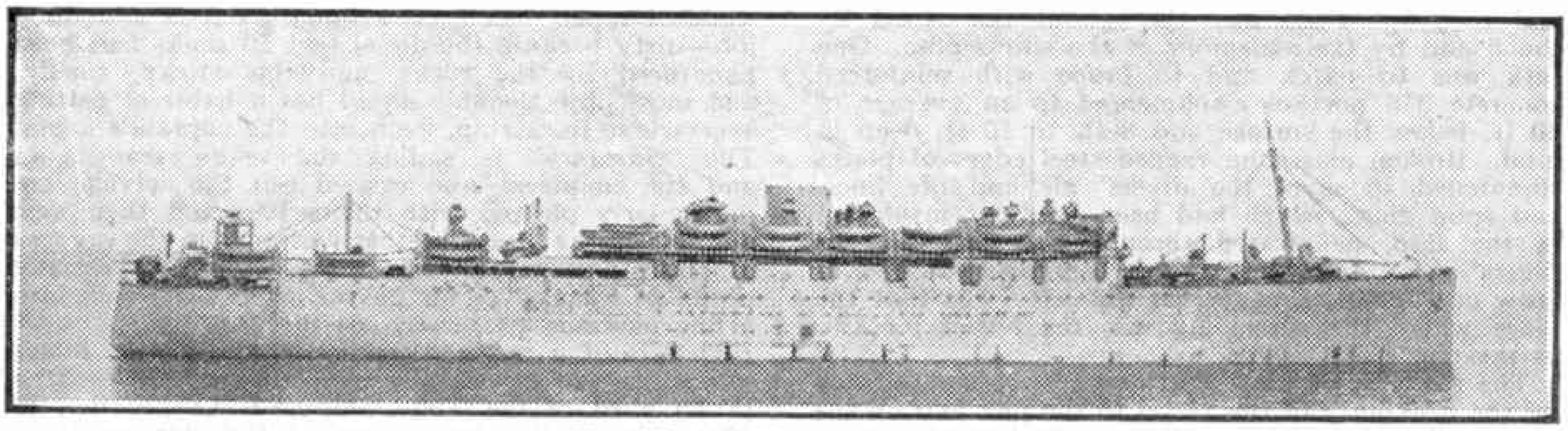
In due course the ship was towed to Karachi which was reached on 31st March 1942. It is believed that this is the longest tow — approximately 2,775 miles — ever performed with a ship as big as the *"Georgic,"* let alone one of such size in derelict condition. An enormous amount of work was carried out at Karachi and on 11th December 1942 the vessel proceeded to sea again *under her own power,* and sailed for Bombay where she was to drydock. Two days later she arrived at Bombay, and once in drydock a careful survey was carried out to ascertain the extent of the damage to the underwater portions of the hull, to check the alignment and paint the hull, examine the propellers and rudder and effect requisite permanent repairs to the damaged shell plating.

Before the *"Georgic"* left Bombay, 5,000 tons of Indian pig-iron were loaded into the holds, disposed equally fore and aft. This ballasted the ship, in addition to earning for her a freight of £10,000. On 20th January 1943 she sailed from Bombay for Liverpool, calling at Capetown for stores. The voyage home was made unescorted at an average speed of 16 knots, compared with her original designed speed of 18 knots, and she arrived safely in Liverpool on 1st March 1943.

It was then decided that the *"Georgic"* should be rebuilt as a troopship proper, and plans to that end were thereupon drawn up by technical experts from the Cunard White Star Company and from Harland and Wolff Ltd., to which latter firm, as builders of the vessel, the job of reconstruction was entrusted.

Fortunately the main hull was not greatly damaged by the bombing, and the propelling machinery also escaped fairly lightly, but it was necessary to remove in their entirety all the decks comprising the superstructure, the greater part of A and B decks, and large sections of the lower decks. All the electrical and sanitary installations had to be replaced, overhaul of the main and auxiliary machinery was essential and the ship needed to be generally refurnished.

Work began in Belfast on 24th May, or to be more accurate work began in Bangor Bay, Belfast Lough, where the



The "Georgic" as a troopship.

ship had to lie until 5th July awaiting a berth. By the time a berth was found for the vessel at No. 3 quay, in Musgrave Channel, more than 550 tons of steel had been removed and the ship was ready for the necessary "major operations," which required the services of a floating crane. By the middle of August 1943 the *"Georgic"* was ready for drydocking, and entered the Thompson Graving Dock for examination and repair of underwater parts. The end of September saw the ship completely opened up and the restoration work begun.

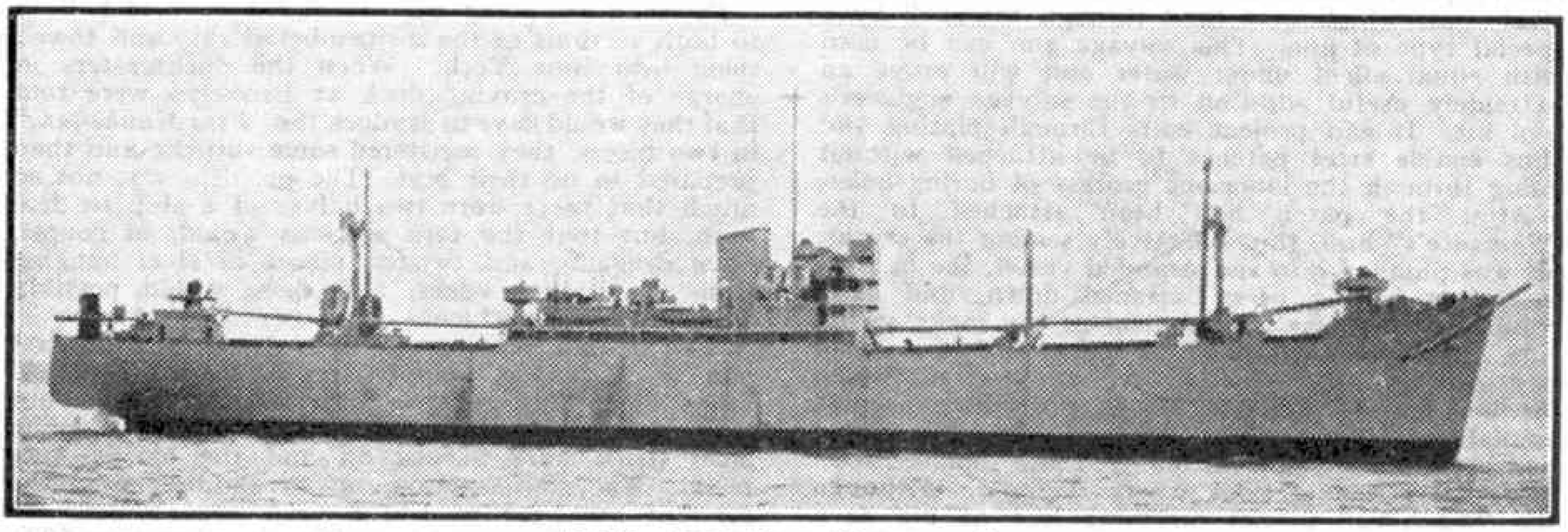
Work was pushed ahead as rapidly as possible but there was an enormous amount to be done; the vessel had been so badly damaged that 5,000 tons of steel had had to be cut away before rebuilding operations could be commenced. By the month of May 1944 the number of men working on the ship had risen to nearly 2,000. During the summer and autumn months the work was intensified and by the beginning of December the task was practically done. On 13th December the *"Georgic"* underwent her trials, and four days later she docked at Liverpool, 19 months after she had sailed, as a war casualty, from the same port.

The story of the thrilling adventures of the *"Georgic"* up to her arrival at Liverpool on 1st March 1943 was told in great detail by Mr. O. S. Nock in the June 1945 *"M.M."*

No article on salvage and repair would be complete without making reference to the *"Lafayette,"* the ex-French liner *"Normandie,"* which unfortunately has had an ignominious end. It will be remembered that this giant vessel went on fire and sank in New York Harbour in February 1942, and was raised in August 1943, the salvage expenses being estimated at $4,500,000. The U.S. Maritime Commission considered in 1944 that it would cost too much to repair the vessel, and the U.S. Navy, to whom she had been transferred, did not want her for a transport.

The *"Normandie"* was built in 1935 at the Penhoet yard at St. Nazaire; she was 83,423 tons gross and was reported to have cost £7,000,000. She was slightly longer and about the same beam as our *"Queen Mary,"* and before the war was the pride of the French mercantile marine.

When the vessel went on fire hundreds of tons of water were poured into her in an endeavour to extinguish the fire and this caused her to roll over on her port side away from the pier, and sink. The task of raising the ship was a formidable one for there were mud and water everywhere. The silt-laden water forced the divers to work in total darkness and they



P.S.N. cargo liner "Samanco"

had to grope their way throughout the vessel by touch and by their memory of the ship's plan. One task was to patch and to brace with reinforced concrete 356 portholes submerged to an average of 60 ft. below the surface and 8 ft. to 10 ft. deep in mud. Broken glass and ragged steel edges of plates threatened to sever the divers' air and life lines, and spun glass, which had been used for insulation in the ship, penetrated through the pores of the divers' skins and could not be removed—it had to grow out again! One further difficulty was that the place where the vessel lay was the outlet for two of the city's big sewers.

The problem of the "*Normandie*" was complicated by the proximity of the vessel to the pier and by the "suction" factor. This suction is the loss of bottom pressure of water through the ground being attached to the hull; in other words, buoyancy has lost its full effect. Experienced divers and salvage engineers have stated that vessels have been seen to jump up a couple of feet when the so-called suction has been overcome. In the "*Normandie's*" case, any sudden "jump" as she refloated and righted might cause the vessel to roll over, crushing the pier and very probably damaging herself extensively in the process.

As a beginning, all the superstructure, save that which was buried in the mud, was sheared off. The hull was then made completely watertight and reinforced to take the necessary pressures and strains. Emergency bulkheads were built in her to assist in this end and to make "controlled pumping" possible. Ninety-three pumps were set to work pumping water out of certain parts of the ship at the same time as water was being pumped into other parts, and air jets were used to help to break the suction. In this way the gigantic vessel was gradually raised, and although she has never been completed by the repair yard and put back into service, her raising was a great engineering feat and will have an important place in the annals of marine salvage.

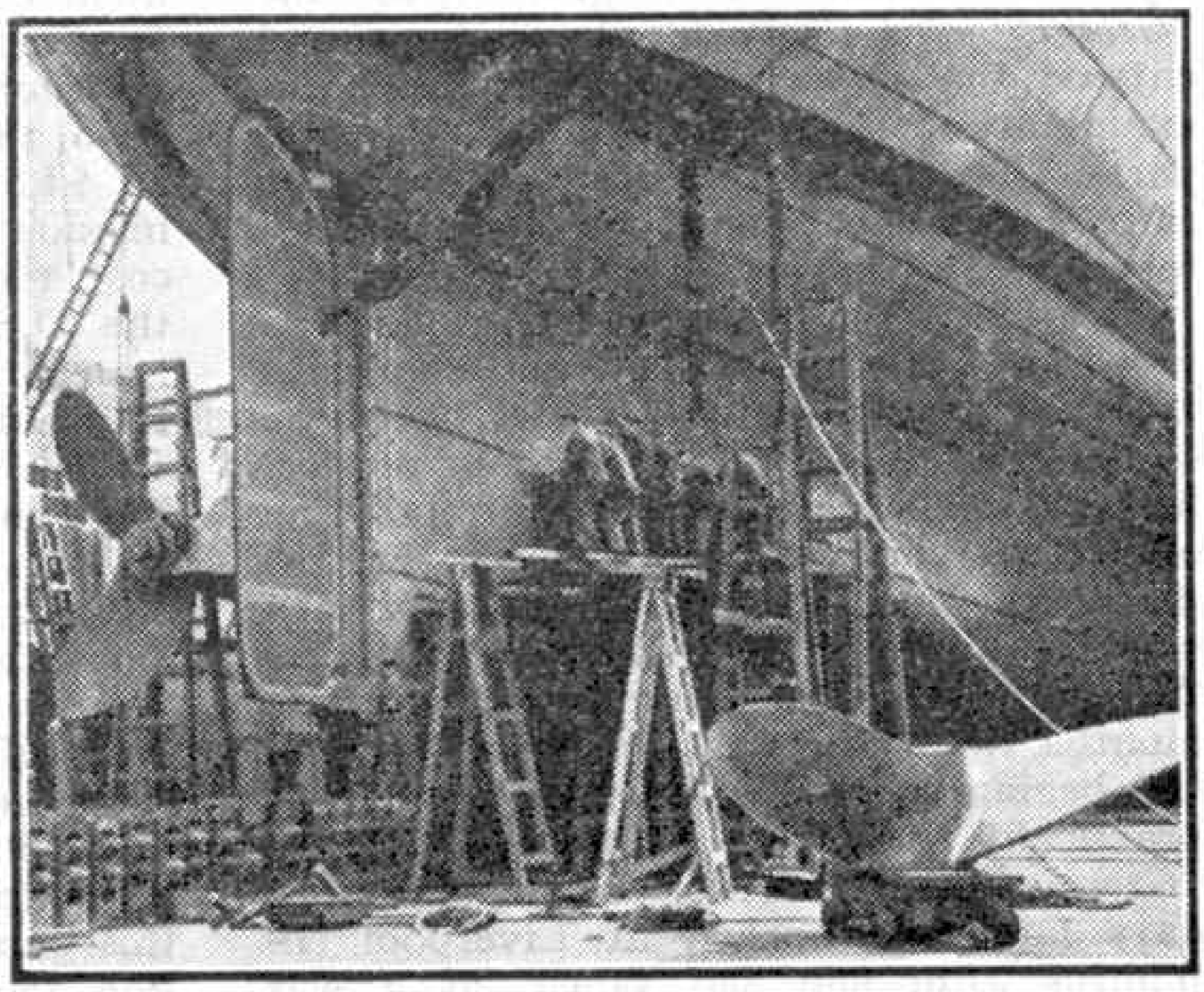
The author witnessed an important salvage job on the shores of Belfast Lough during the past year following the stranding of the P.S.N. cargo liner "*Samanco.*" This fine motor vessel, which had only been in service for some 14 months before the accident occurred, was driven ashore while lying at anchor near Bangor, Co. Down, during a fierce northerly gale, and was badly holed on some jagged rocks. She had a valuable cargo of war materials for the Allies.

The cargo was taken off with great difficulty, and a large rubber patch fitted over the crack which ran up both sides of the vessel and resulted in her almost breaking in two. It is interesting to note that the rubber patch was attached to the shell plating by steel studs which were fired through the shell by a special type of gun. This salvage gun can be used with equal effect under water and will prove an extremely useful addition to the salvage engineer's tool kit. It can project bolts through plating and thus enable steel patches to be attached without going through the laborious process of boring holes.

After the patch had been attached to the "*Samanco's*" hull, thus effectively sealing the cracks, air was pumped into the stranded vessel, the hatches meantime having been battened down, and as a result the ship was floated clear of the rocks at full tide. She was then beached on a sandy-bottomed bay near by and further lightened and strengthened for her tow to Belfast. When a drydock became available at Belfast the "*Samanco*" was docked and had her damaged bottom removed and replaced with new plates and sections where required. Although the "*Samanco*" is not anything like as big as a passenger liner, she is a large cargo ship, and the work of repair has been a long, arduous and dirty job—dirty because the diesel fuel oil tanks had been punctured by the rocks, and this sticky, smelly, and most objectionable liquid has a habit of getting everywhere on a ship, even into the captain's cabin! The "*Samanco*" is sailing the seven seas again and the engineers who carried out the salvage are particularly pleased with themselves and their new gun for having saved another victim from the ravages of the storm while the ship-repairers are equally proud of themselves for having turned a wreck into a fine new and extremely useful cargo liner.

Details of a very interesting major tanker-repair job, which was successfully completed at the Brooklyn (N.J.) yard of the Todd Shipyards Corporation in 1944, give a fine impression of the ship-repairer's skill. The vessel concerned was the "*Esso Manhattan,*" a single screw turbo-electric tanker of 10,172 tons gross, which broke completely in two, the two halves being rejoined in the remarkably short space of 63 days.

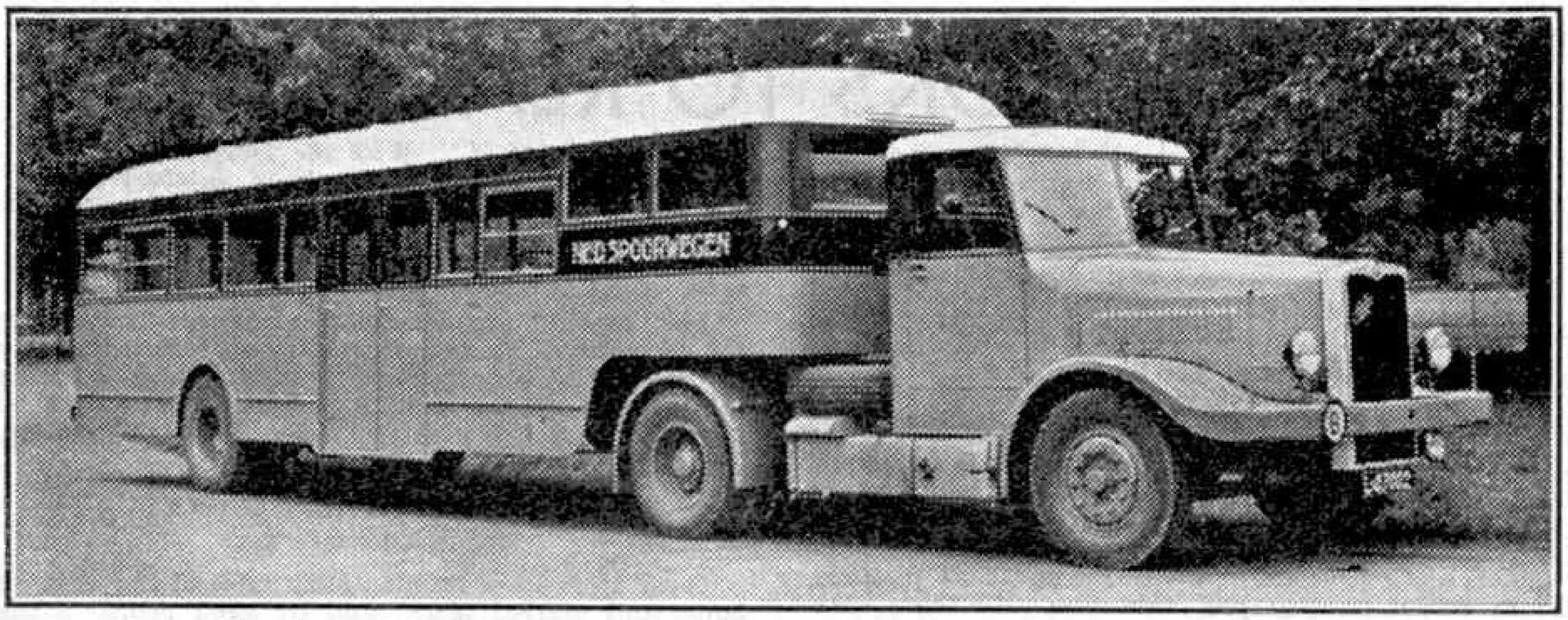
The "*Esso Manhattan*" was outward bound in ballast from an American East Coast port when the disaster occurred in high seas. The stern half took a deep plunge, as the ship broke apart, and it looked for a time as if both sections would sink. However, the watertight bulkheads held, and sufficient buoyancy was maintained to keep the water from flooding the engine room in the after part. Fortunately conditions were such as to permit of salvage operations being carried out.



Repairing the tail-shaft of a liner in drydock.

Powerful sea-going tugs managed to attach lines to both sections of the dismembered ship and towed them into New York. When the dockmasters in charge of the graving dock at Brooklyn were told that they would have to drydock the "*Esso Manhattan,*" in two pieces, they registered some surprise and then prepared to do their best. The problem was not so much that there were two halves of a ship to deal with, but that the torn sections would, of course, have dragging and twisted pieces of steel hanging from the broken edges, and these would possibly catch on the keel blocks.

The aft end was brought into the dock stern first and the dock was pumped free of water. The steel "rags" had knocked over some of the blocks, but the section was resting securely and the hanging steel strips were burned off and the blocks were re-set. The stern section, up to and including the forward bulkhead of No. 8 tank, was centred on the blocks and checked for (*Continued on page 522*)



Trailer Omnibus of the Netherlands Railways. Photograph by courtesy of Crossley Motors Ltd.

On The Road

Trailer Buses for Netherlands Railways

We illustrate one of the new trailer buses of the Netherlands Railways, which inaugurated the first permanent post-war continental road passenger service between Zwolle and Nijmegen.

The bus incorporates a Crossley oil-engined short wheelbase tractor with a Dutch-made trailer and bodywork, designed to accommodate 52 passengers seated and 28 standing. The combination is painted in two attractive shades of green, has white roofs and a wide red band in front of the trailer.

Crossley Motors Ltd. are supplying 250 of these tractors, which are powered by a 6 cylinder direct injection diesel engine and fitted with left-hand steering.

1936 British Midget Cars

Midget cars are again in the news, this time on show in Paris. Many of our readers will remember the "Rytecraft" Scoota-car and Scoota-truck which were very popular both in this country and overseas during 1936. They were introduced by the British Motor Boat Manufacturing Co. of London and had overall dimensions of 8 ft. by 3 ft. 6 in. The power unit was a 250 c.c. single cylinder air cooled engine and had a very economical petrol consumption of 80 miles to the gallon. Unfortunately the manufacturers are at present fully engaged on light agricultural and marine engine work, and are not yet in a position to resume manufacture of these midget cars.

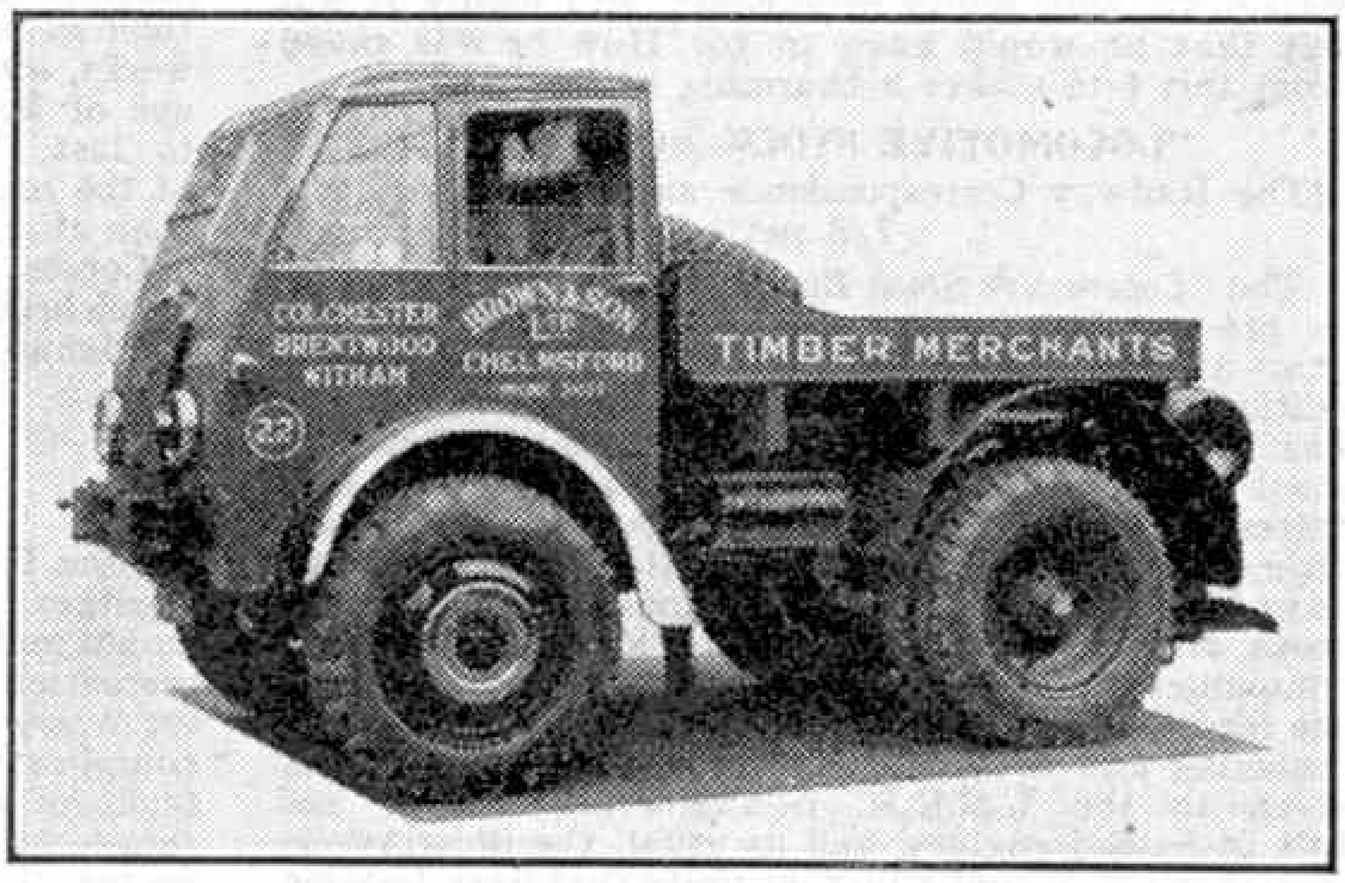
A Sturdy Timber Tractor

Timber haulage requires various special types of vehicles, but the most common in use is the tractor and trailer type, because tractors can be manœuvred in confined spaces, and are easily detached from the trailer if required for any other task. The Foden S.T.G.5 timber tractor illustrated on this page is a typical example of the type used in the timber trade and is said to pull a load of 12 tons at speeds up to 25 m.p.h. Excellent visibility, ease of control and sturdy construction are points of interest, also worth noting are the "Trakgrip" tyres fitted to all wheels, and the large 90 gallon fuel tank situated at the rear of the chassis.

The engine, mounted on three-point suspension, is a Gardner five cylinder diesel, developing 85 b.h.p. at 1,700 r.p.m. A very efficient winding gear is installed at the rear of the tractor and is controlled by a powerful brake operated from the driver's seat. A further interesting feature is the anchor, which is mounted on the rear axle and supported by two robust chains. This also is controlled from the driver's seat; it is used to prevent the tractor from slipping backwa d when pulling down or uprooting trees.

Modern American Bus Garage

A new bus garage completed by the Los Angeles Transit Lines of America is claimed to be the most modern in the world. All vehicles are serviced on the assembly line principle, moving continuously forward. They are first re-fuelled, and then passed to an automatic washer operated by an "electric-eye;" from here they are diverted to the repair shop, paint shops or general garage. Deep inspection pits are installed, similar to those in British locomotive sheds, and flush lighting in the pit walls provides ample illumination for the various servicing jobs on hand. It is possible to keep the floor perfectly clean because all oil and grease is supplied under pressure to numerous flexible pipe lines distributed around the garage.



A Foden diesel oil-engined timber tractor. Photograph by courtesy of Fodens Ltd.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members and certain others that will be indicated, these should be ordered through a bookseller.

"TALKING OF BUTTERFLIES, MOTHS AND OTHER FASCINATING INSECTS"

By L. Hugh Newman, F.R.E.S.
(Littlebury. 10/6 net)

Mr. Newman is well-known to readers of the "*M.M.*," to which he has contributed many splendid articles, and there will be few who will not be delighted with these very human stories of his adventures among butterflies, moths, dragonflies, ants, spiders and even flies, and with the excellent pictures, from actual photographs, that illustrate them. His book contains stories that he has told in the Children's Hour of the B.B.C., to whom he is the "Butterfly Farmer."

Mr. Newman actually takes us with him, at home and abroad, when searching for rare specimens or taking part in some exciting episode, such as the sudden appearance of a cloud of insects scarcely ever seen in this country. His butterflies indeed seem to come to life for us, and we certainly learn more about them than we could from mere description. Moths are treated in the same way, and some of those that are described and illustrated are amazing for their size and the wonderful colours that they display. From butterflies and moths we pass on to beetles, spiders, ants and flies, whose astonishing secrets are revealed to the reader in Mr. Newman's pleasant talks.

Finally there are chapters telling us what is on the wing from May to August, full of really fascinating stories of May flies, grasshoppers and crickets. Altogether this is a fine book, delightful to read and full of wonderful things.

"BANJO THE CROW"

By Theodore Du Bois (Harrap. 6/- net)

The story of Banjo, a tame crow, is one for the younger "*M.M.*" readers. Banjo was rescued from a dog, but not before his wing had been broken. Under the care of Tommy Nesbitt and his sister he quickly learned all kinds of tricks. He had escapes from marauding cats, owls and other enemies, and did his best to get lost once or twice. Worse still, he developed a capacity for mischief, making loud noises early in the mornings, ruining gardens by nipping off flowers, tearing up towels and leaving footprints on window sills. This made him really unpopular with stuffy neighbours, and finally it was felt that he would have to go. How he was saved from this fate makes a charming little story.

"LOCOMOTIVE STOCK BOOK 1946"

(The Railway Correspondence and Travel Society. 7/6 net)

The "*Locomotive Stock Book*," an annual publication in pre-war days, makes a welcome reappearance this year after a gap of seven years, and the present edition is the largest and most comprehensive that has been published. It details the classified locomotive stock of British railways at the end of 1945, and traces in detail changes in stock year by year from 1939, showing new engines built and those that have been withdrawn and also those reinstated into stock after withdrawal. Wartime loans between the companies themselves and the War Department also are recorded, and there are full details of rebuildings, renaming and re-numbering; and special attention is given to the L.N.E.R. re-numbering. There are lists of named engines, and as usual, the illustrations show engines or motive power units that have become extinct since the last publication. A useful feature is the grouping of engines under wheel types, subdivided in accordance with official classifications.

The book is produced by locomotive enthusiasts for locomotive enthusiasts, and succeeds admirably in its object of supplying complete and accurate information at the minimum cost. Copies can be obtained price 7/6 post free, from Mr. A. A. Young, 34, Birch Grove, Acton, London W.3.

"FAIRY TALES FROM TURKEY"

(Routledge. 6/- net)

These stories are genuine fairy tales of the Turkish home and market place, told by aged people living in or near Istanbul. They have been carefully selected and translated by Marjory Kent, and are here presented for the pleasure of English reading children. They are all delightful. In them we are for the most part in the country, for city scenes are few, and there we meet the cunning fox, the headstrong hare, the faithful horse and the wise lion in enchanted forests, and mystic fairy princesses add a touch of the "Arabian Nights." The human beings and animals that figure in the stories show remarkable understanding and wisdom in the true fairy tale tradition. Younger "*M.M.*" readers will appreciate this and the magic element that runs through all the stories.

A coloured frontispiece and eight other full page illustrations by Olga Lehmann add to the attractions of the book.

"THE HULL AND BARNSLEY RAILWAY"

By G. D. Parkes
(The Oakwood Press. 3/6 net)

The Hull and Barnsley was the last big railway scheme in this country to be launched successfully as an independent concern. It was built as a direct challenge to the monopoly in an area served by the North Eastern, but was finally taken over by that line in the year before the large-scale groupings of British railways took effect. Dr. Parkes is well qualified to tell its story, which is full of deep interest for the railway enthusiast.

The first sections of the book deals with the origin, development and passing of the line. Then follows a description of its principal engineering features and gradients, and the route followed is shown in a map that shows the tracks of other systems and of the joint lines in the locality. The locomotives and the carriage and wagon stock have separate sections to themselves, and there is an account of the Springhead works, where they were maintained under the fatherly eye of Matthew Stirling, who ruled there from first to last. The illustrations include views of several of the more notable Hull and Barnsley engines, with their characteristic domeless boilers and rounded cabs.

Copies of the book can be obtained from the publishers, The Oakwood Press, 30, Whitehouse Hill, Chislehurst, Kent.

"THINGS TO MAKE AND DO"

By William A. Bagley
(Vawser and Wiles. 3/6 net)

More than 60 profitable things to make are gathered together in this book. Many of the articles described would make presents, and others will provide excellent recreation for their constructors. There is something for every degree of skill and for every season, and complicated sets of tools and special workshop facilities are not required. Readers who like to make things will find the book very useful indeed, both in regard to subjects and to methods to be followed, clear descriptions of these being accompanied by excellent drawings.

Club and Branch News

WITH THE SECRETARY

ENJOY FESTIVITIES THIS CHRISTMAS

This month the thoughts of all Club members are on the delights of the social gatherings that are invariably held during the Christmas and New Year season. In this they are right, for comradeship and good will are essential Meccano Guild features, and anything that can add to the good spirits of Club members should be encouraged. I hope that in every Club there will be at least one meeting devoted to fun and games, with plenty of good refreshments, and that as many as possible will see their way to extending their hospitality to prospective members, or to the parents and friends of existing members.

This festive season is also the time for a little serious thought, however. It may have been found that some particular item in the programme has not aroused the keenness and enthusiasm that is looked for at Club meetings. If so, now is the time to drop it and to find an alternative. Fortunately this is usually easy, for while some items may not have proved attractive others will certainly have shown themselves to be just what the members want. while there are always new schemes to be tried out.

MERIT MEDALLION NOMINATIONS

Leaders also should keep in mind their nominations for Merit Medallions. In a month or two I shall publish the list of 1946 winners of this award, and if Leaders wish their Clubs to be well represented in this list, as they should be, they should make their decisions at once. There are two Merit Medallions for each Session in each Club, and all that the Leader has to do in each case is to pick out the members who have done the best work on behalf of the Club, either as organisers, as contributors to the programmes, or as recruiting agents. Any good work on behalf of the Club can be recognised in this manner, and I want all Leaders who have not yet done so to send me their nominations within the next month.

RECENTLY INCORPORATED BRANCHES

496. Gowerton Boys' Grammar School—Mr. T. S. James, Headmaster, Gowerton Boys' Grammar School, Loughor, Swansea, Glam.
497. W.H.P.S. (Whips)—Mr. W. H. MacRobert, Waterkloof House School, Brooklyn, Pretoria, South Africa.

PROPOSED BRANCHES

Exmouth—Mr. V. C. Clarbull, 5, Turner Avenue, Exmouth.

Bedminster—Mr. Barrow, 104, St. Peter's Rise, Headley Park, Bristol 3.
West Wickham—Mr. D. J. Hancock, 12, Manor Road, West Wickham.
Harrow—P. Rhodes, 51, Kingsway, Harrow.
Bagshot—D. C. Bradbury, "Hero of Inkerman," Bagshot, Surrey.
North Ashton—G. H. Littler, 121, Billinge Road, North Ashton, Nr. Wigan.
Sheffield—Mr. H. Johnson, 17, Scotia Close, Manor Estate, Sheffield 2.
Cork—Mr. M. O'Connell, 105, Lower Road, Cork, Eire.
Shirley—Mr. R. G. Parker, 44, Hazeloak Road, Shirley, Nr. Birmingham.

Mr. C. Kemp, a Deputy Leader of the Hornsea M.C., Leader, Mr. R. W. Shooter, Secretary, P. Hobson. This fine Club has had a long and successful career. It was affiliated with the Guild in April 1930, and the programme followed has been notable for its variety, including electrical and scientific experiments, cinema shows and indoor games, in addition to Meccano model-building and Hornby Train operation.

Club Notes

Henleaze (Bristol) M.C.—An excellent start was made with the programme of the Winter Sessions. Mr. R. E. Frost, Leader, has been ill, and during his absence the father of one of the members has kindly taken over his duties. Locomotive coaling plant models were demonstrated at one meeting. and others have been devoted to Hornby Train operation to timetable. Club roll: 18. *Secretary:* M. E. Frost, 32, Oakwood Road, Henleaze, Bristol.

St. Oswalds M.C.—Model-building competitions continue the most popular feature, other attractions including a monthly Hobbies Night and Track Nights, when Hornby Trains are run to timetable. Railway postcards are shown with the aid of an episcope. A monthly magazine is to be tried. Club roll: 32. *Secretary:* D. R. C. Pavey, 37, Croft Road, Norbury, London S.W.16.

AUSTRALIA

Maylands (Perth) M.C.—Recent outstanding events have included successful exhibitions, at one of which the proceeds amounted to nearly £8. Table Tennis and Darts Championships Tournaments also have been arranged. At the regular Model-Building sessions a travelling Gantry Crane, Steam Wagon and Trailer, Bagatelle Table and a Roundabout have been constructed in addition to a Meccanograph and a "Pacific" Tank Locomotive. Club roll: 28. *Secretary:* B. Stewart, 69, 9th Avenue, Maylands, Western Australia.

Branch News

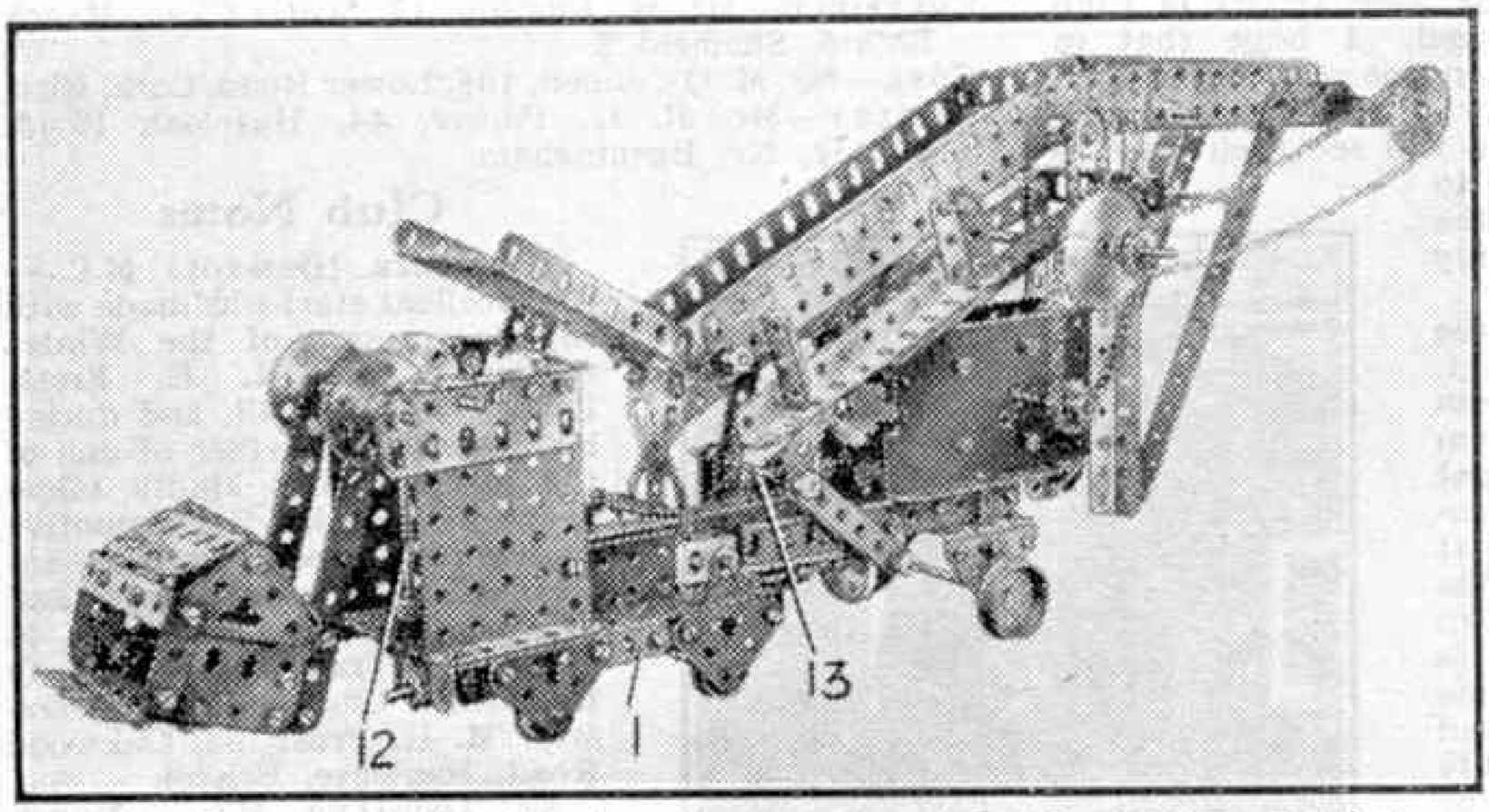
Banbury—Track meetings continue to be the chief feature of the programme. "Specials" are frequently run in addition to the regular timetable goods and passenger trains. Plans are being made to operate a "*Cornish Riviera*" Train Set. *Secretary:* D. Hopkins, 348, Warwick Road, Banbury, Oxon.

The Perse School—A special feature has been made of Film Shows and Lantern Lectures. A special visit to four important junctions was greatly enjoyed. *Secretary:* D. Mann, 151, Shelford Road, Cambridge.

New Meccano Model

Mobile Rubble Loader

THE model rubble loader shown in the accompanying illustrations is based on a machine used in the United States for removing rubble and debris in tunnelling operations. It consists of a large bucket shovel that forms the front of the machine, and is pivotally mounted so that it can be swung upward and backward to discharge its contents down a chute that leads to a conveyor belt. The conveyor carries the material to the rear of the machine where it is discharged into wagons.



The Meccano Rubble Loader, showing the shovel in loading position.

The model is begun by building the chassis. The front portion is built up from two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates connected by two $5\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The Flanges of the Plates are joined by $1\frac{1}{2}''$ Strips 1, and four $1\frac{1}{2}''$ Corner Brackets provide the journals for two $3\frac{1}{2}''$ Axle Rods that carry four $\frac{3}{4}''$ Flanged Wheels. The rear trolley consists of two $1\frac{1}{2}''$ Corner Brackets joined by three $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 2. The Corner Brackets provide journals for the $3\frac{1}{2}''$ Axle Rod that carries two $1\frac{1}{2}''$ Flanged Wheels.

The two trolleys are connected together by four $5\frac{1}{2}''$ Angle Girders that overlap five holes. These Girders are connected to the front trolley by four $1'' \times \frac{1}{2}''$ Angle Brackets, and to the rear trolley by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate and two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are bolted along the Girders and the turned-up ends support the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate. The rear flange of the $2\frac{1}{2}'' \times \frac{1}{2}''$ Flanged Plate carries a Double Bent Strip to form a coupling device.

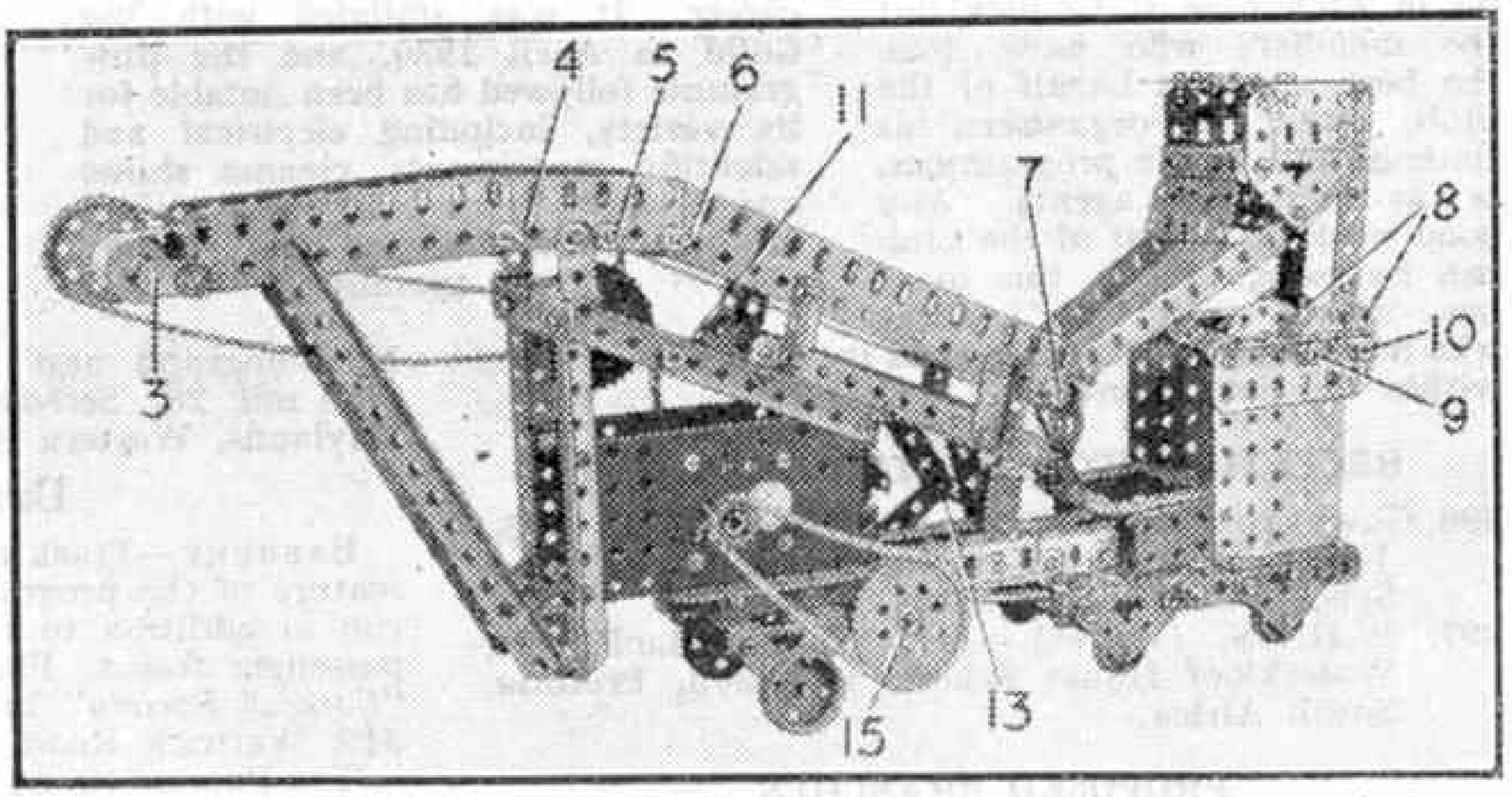
Two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates are used to support the bucket-and-rocker-arm assembly. They are bolted to the front trolley with the flanges outermost, and a 3" Flat Girder is connected to the top of each Plate so that the rear part overlaps five holes. The $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates are spaced at the top by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which carries a Double Bent Strip used to fix a Flanged Sector Plate in position to form a chute from the bucket to the conveyor. The narrow end of the Sector Plate is supported by a Trunnion and a Flat Trunnion bolted point to point. The Flat Trunnion is joined to the Sector Plate by Obtuse Angle Brackets, and the Trunnion is connected by its flange to a square frame made from three $2\frac{1}{2}''$ Strips and a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is bolted to the sides of the two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates, and the frame is joined to two $1\frac{1}{2}'' \times \frac{1}{2}''$ Channel Bearings, as shown in the illustrations.

The conveyor is built up on an E20B Meccano Electric Motor, and this is bolted to the Double Angle Strips on the rear trolley by means of two 2" Screwed Rods. The supports for the conveyor are built up from $5\frac{1}{2}''$ and $7\frac{1}{2}''$ Angle Girders, as shown in the illustrations.

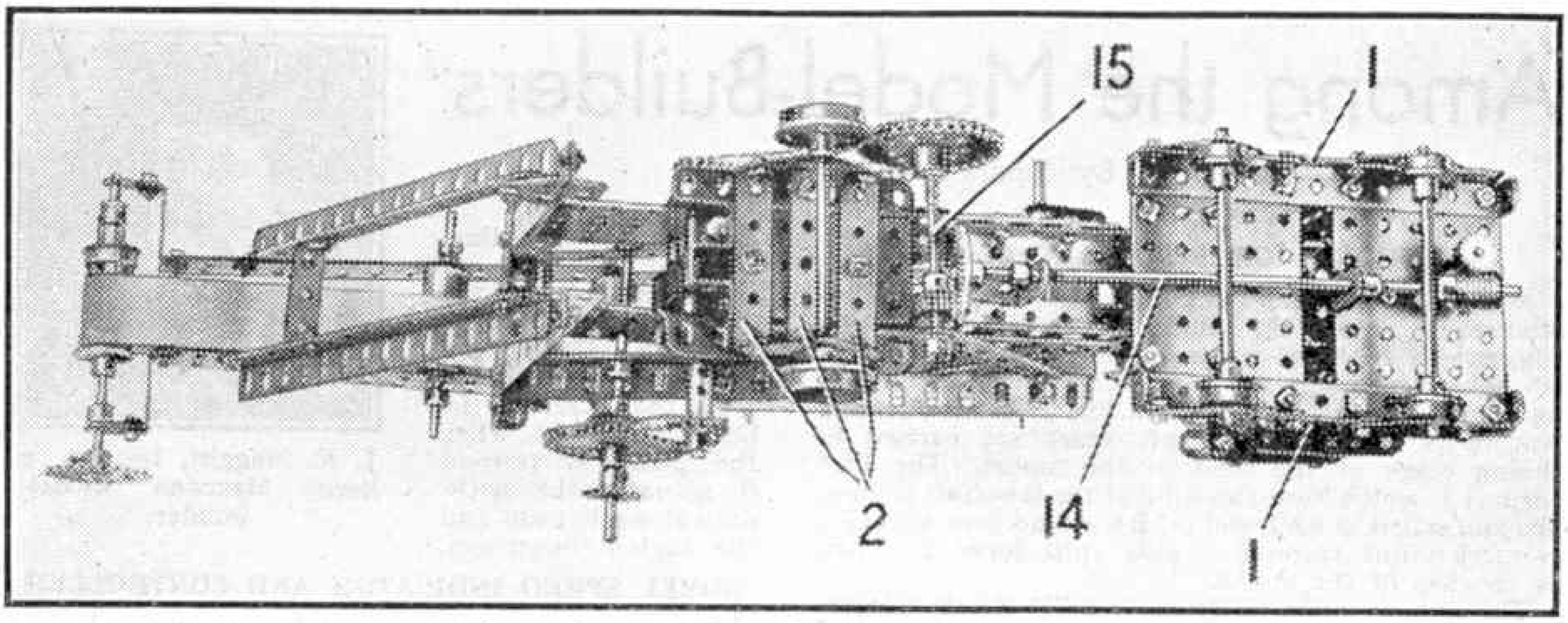
The sides of the conveyor consist of Flat Girders. Two $1'' \times \frac{1}{2}''$ Angle Brackets support the middle of the conveyor and are bolted to the vertical supports. The rollers for the conveyor, which is an endless strip of stout paper, are Sleeve Pieces with Chimney Adaptors mounted on Rods 4, 6 and 7. Flanged Wheels form the ends of the roller 3. Spring Clips are fastened inside the Sleeve Pieces on the roller 6 to make it rotate with its Rod. Axle Rods are used as supports for rollers 3, 4, 6 and 7.

A Threaded Coupling connects a $\frac{3}{4}''$ Sprocket to the driving shaft and carries the drive to 3" Sprockets on $4\frac{1}{2}''$ Rod 11. Sprockets on each side of the 3" Sprocket on Rod 11 take the drive to a further $\frac{3}{4}''$ Sprocket on Rod 6 and a $1\frac{1}{2}''$ Sprocket on Rod 3.

The bucket is built from two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plates joined together by Obtuse Angle Brackets. A 2" Flat Girder and a $1\frac{1}{2}''$ Corner Bracket make up



Another view of the Rubble Loader, with the shovel raised to discharge its contents on to the conveyor.



An underneath view of the Rubble Loader.

each side and are held together by 1½" Strips. The front portion is connected by a 2½" × 1½" Double Angle Strip used to space the sides, and it is hinged to a 2½" Flat Girder used as a flap.

Two 1½" × ½" Double Angle Strips connect the bucket to two 4½" Strips. In the model these are built from two 3½" Strips. The 3½" Axle Rod 10 carries two 57-teeth Gears and passes through the end holes in the Strips that form the arms for the bucket. These Strips are bolted to the 57-teeth Gears as shown in the illustration. The Gears engage two ½" × ¼" Pinions on the 3½" Axle Rod 9 and the drive is transmitted to this Rod by a 1½" diam. Contrate Wheel.

The drive is taken from under the chassis by a 3½" Axle Rod 12 that carries a ½" × ¼" Pinion, which engages the 1½" diam. Contrate Wheel. The top of the Rod is supported in the end of a Handrail Coupling. The Coupling is held on the Rod 9 and spaced from the Contrate by four Washers. The end of the Rod 12 extends under the front of the Flanged Plate and carries a ½" Pinion that engages a Worm on the 8" Axle Rod 14 shown in the underneath view of the chassis. This 8" Rod is supported by two 1" × ½" Angle Brackets and held in position with Collars. The drive is transmitted to the 8" Axle Rod by a 1½" Contrate that meshes with a ½" Pinion on the 3½" Axle Rod 15, which carries a 2" diam. Sprocket spaced from the Fishplates used to support it, by a Compression Spring and Washer. This 2" Sprocket takes the drive from the Motor.

The Pinion on the 3½" Axle Rod can be meshed with the Contrate by means of a 3" Strip used as a lever, the end of which is spaced by 3½" Axle Rod 13, supported by a 2½" and a 2" Strip. The end of the Rod 13 carries a Cranked Bent Strip that has a Threaded Pin bolted in its end.

Parts required for Mobile Rubble Loader: 4 of No. 3; 1 of No. 4; 4 of No. 5; 1 of No. 6; 4 of No. 6a; 2 of No. 8b; 10 of No. 9; 4 of No. 9f; 9 of No. 10; 4 of No. 12a; 6 of No. 12b; 4 of No. 12c; 1 of No. 13a; 2 of No. 15a; 9 of No. 16; 2 of No. 16a; 1 of No. 16b; 1 of No. 18b; 2 of No. 20; 6 of No. 20b; 5 of No. 26; 2 of No. 27a; 2 of No. 28; 1 of No. 32; 2 of No. 35; 145 of No. 37; 8 of No. 37a; 26 of No. 38; 1 of No. 44; 2 of No. 45; 2 of No. 48; 5 of No. 48a; 2 of No. 48d; 4 of No. 51; 4 of No. 53; 1 of No. 54a; 26 of No. 59; 1 of No. 63c; 2 of No. 81; 1 of No. 94; 2 of No. 95; 1 of No. 95a; 4 of No. 96a; 2 of No. 103c; 4 of No. 103e; 2 of No. 103f; 2 of No. 114; 1 of No. 115; 1 of No. 120b; 2 of No. 124; 3 of No. 126; 1 of No. 126a; 8 of No. 133; 1 of No. 136a; 2 of No. 160; 4 of No. 163; 6 of No. 164; 1 E20B Electric Motor.

Prizes for Meccano Models

Last month we announced details of the "Autumn" Model-Building Competition. The Home Section of this Contest closes on 31st December, but the Overseas Section will remain open until 30th April, 1947. This Contest is open for Meccano models of any kind built from any size of Outfit or number of parts, and there are no age limits. Readers living in any part of the British Isles or Overseas can take part in the Contest.

Competitors should try to incorporate in their models some ingenious use for a Meccano part or some novel movement. Models displaying originality, no matter how simple they may be, will stand the best chances of winning the prizes.

When the model is complete a photograph of it should be prepared, but if this is not possible a good sketch will do. The competitor's age, name and address should be written on the back of the illustration, and it should be sent, together with a brief description of the model, to "*Autumn Model-building Competition, Meccano Ltd., Binns Road, Liverpool* 13." That is all there is to do.

The following prizes will be awarded for the most interesting and well-built models submitted: First, Cheque for £2/2/–; Second, Cheque for £1/1/–; Third, Cheque for 10/6. There will also be a number of consolation prizes.

Competitors who would like to have their photographs or drawings returned to them after the entries have been judged should enclose a stamped addressed envelope for that purpose. Photographs or drawings of prize-winning entries will not be returned.

"SIMPLICITY" MODEL-BUILDING CONTEST RESULTS (Home Section)

1st Prize, Cheque for £2/2/–; P. Hancock, Edinburgh. 2nd, Cheque for £1/1/–: R. Morris, Barrowford, Nr. Nelson. 3rd, P.O. for 10/6: K. Pepper, Cardiff.

Consolation Prizes of 5/–: N. Wroe, Dewsbury; E. Phillips, Bulford Barracks; A. Reeve, Melton Mowbray; D. Yarly, New Malden; J. Waite, Wakefield; A. Walker, Edinburgh.

"HOME GADGETS" MODEL-BUILDING COMPETITION (Overseas Section)

1st Cheque for £2/2/–: K. Boocock, East Oxford, New Zealand. 2nd, Draft for £1/1/–: Lars Linder, Goteberg, Sweden. 3rd, Cheque for 10/6: F. Pye, Westmead, Australia.

PICTURE PUZZLE CONTEST (Home Section)

1st Prize, Cheque for £2/2/–: B. R. M. Munden, Surbiton. 2nd, Cheque for £1/1/–: R. Edwards, Shrewsbury. 3rd, P.O. for 10/6: B. Wordsworth, Sheffield.

Consolation Prizes of 5/–: H. Gordon Johnston, Southall; A. R. G. Burrows, Bournemouth; P. G. Goddard, Farnborough Park; C. E. Wrayford, Bovey Tracey; K. D. Curtis, Cheltenham.

Among the Model-Builders

By "Spanner"

J. E. Meggitt, Ipswich, a keen Meccano model-builder.

A COMBINED GEAR-BOX AND CLUTCH

Mr. R. F. Newton, Buckhurst Hill, is a very keen Meccanoite, who has submitted several interesting suggestions to these pages in the past. Another of his achievements is the somewhat unusual gear-box and clutch mechanism shown in Fig. 1. An interesting feature is that the lay-shaft gears are carried in sliding cages at the sides of the model. The Flat Girders 1, which form the sides of the lay-shaft frames, are journalled at each end on Rods, and gear selection is carried out through a gear shift lever 2 shown at the top of the model.

The gate is built up from two 3½" Angle Girders joined by two ½" Bolts. Each Bolt carries a Fishplate spaced from the Girders by Nuts. These Fishplates

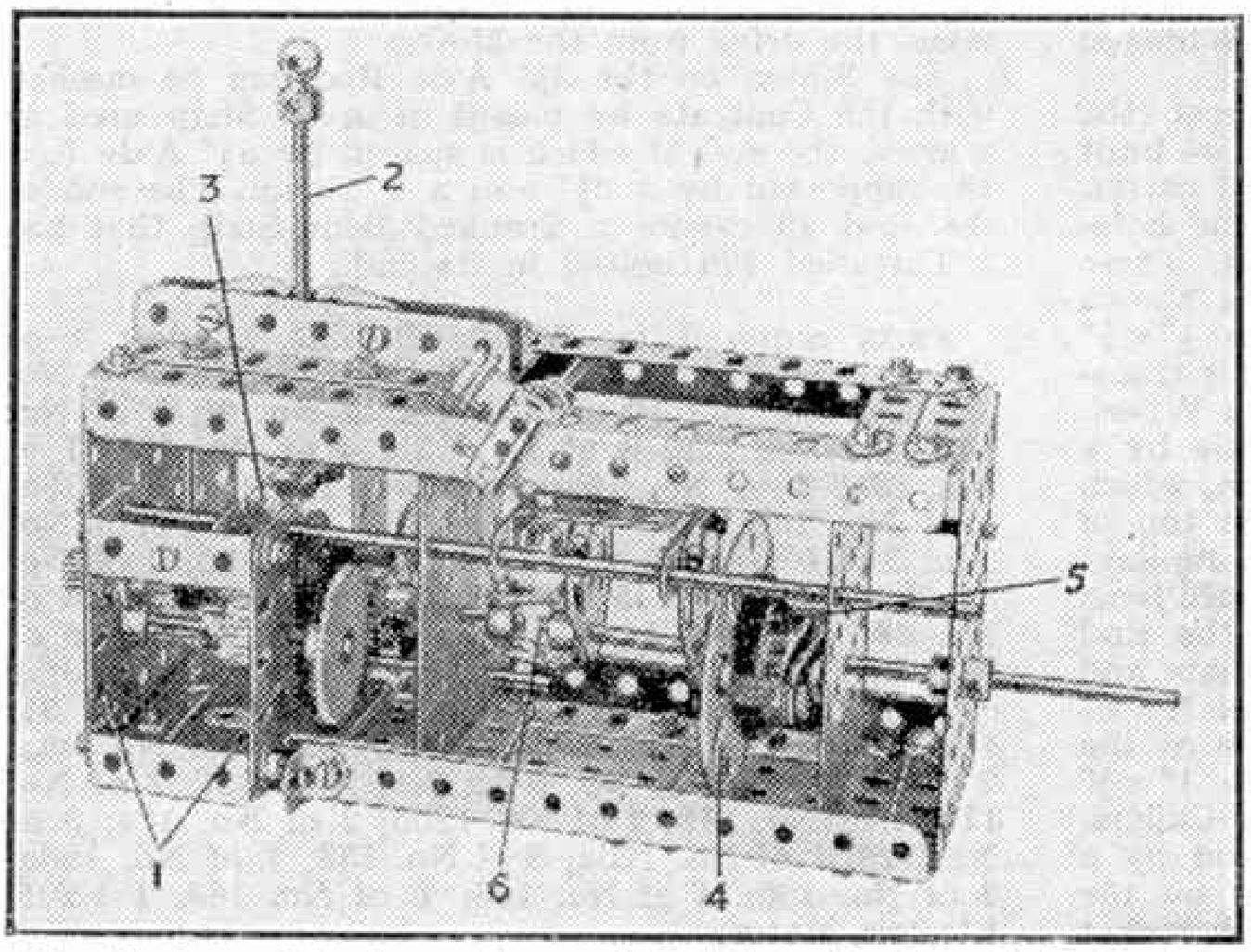


Fig. 1. A combined gear-box and clutch designed by R. F. Newton, Buckhurst Hill.

are arranged to form an H-type frame with four positions, indicating three forward speeds and a reverse. The gear lever is made from a Screwed Rod, and a ball-bearing mechanism is built up from Cranks and Couplings. A 2½" Rod 3 fitted with a Coupling at each end is used as the selection lever and slides the lay-shaft cages into the required position.

The clutch plates 4 and 5 are made from a Face Plate and a 1" Pulley fitted with a Motor Tyre. The Pulley is held against the Face Plate by two Springs, and a withdrawal mechanism is built up from two Flat Trunnions and two 2½" × ½" Double Angle Strips. A lever for the clutch release mechanism is made from a Crank mounted on a 3" Rod. The arm of the Crank causes the withdrawal cage to slide longitudinally on its guide Rods, and by means of an extending Coupling 6, built from Fish-plates and Collars, the driving shaft is levered forward and the Face Plate unit of the clutch disengages.

The ½" Pulley held in the end of a Coupling, seen at the side of the model, forms the clutch pedal. The Coupling is held on the end of the 3" Rod that carries the Crank, so that when the pedal is pressed it actuates the withdrawal mechanism and the clutch disengages.

NOVEL SPEED INDICATOR AND CONTROLLER

Various speed indicating and controlling devices have been described in the "*M.M.*" from time to time, and this month I am able to include a particularly novel arrangement sent to me recently by an enthusiastic model-builder living at Flixton, Lancs. Unfortunately this contributor's name and address has been mislaid, and I shall be glad if he will write to me.

The device is shown in Fig. 2. It consists of a governor, which is made up from four 2½" Strips bolted to Collars 1. These are fitted with two weights each consisting of twelve ¾" Washers 2, spaced on each side of the 2½" Strips and held in place by a lock-nutted 1" Screwed Rod. The Screwed Rod also carries a Fishplate 3, which is used as a means of attachment for a tension Spring.

The speed indicator is made up from a sliding Rod that is actuated by the governor, and a rack 4, built up from ¾" Washers equally spaced by Washers. A Rack Segment carrying a pointer engages the Washers, and as the governor weights fly outward under centrifugal force the Rack Segment is pulled around its pivot and the Pointer moves across a fixed scale.

A sliding Coupling used in conjunction with the indicator is built up from two Bush Wheels as follows. Two Threaded Bosses are bolted diametrically opposite on the face of one of the Bush Wheels, and they carry 1½" Rods that pass through corresponding holes on the other Bush Wheel.

A FINE PRIZE-WINNING LOCOMOTIVE

The model shown in Fig. 3 is an excellent reproduction of an American "Austerity" type locomotive.

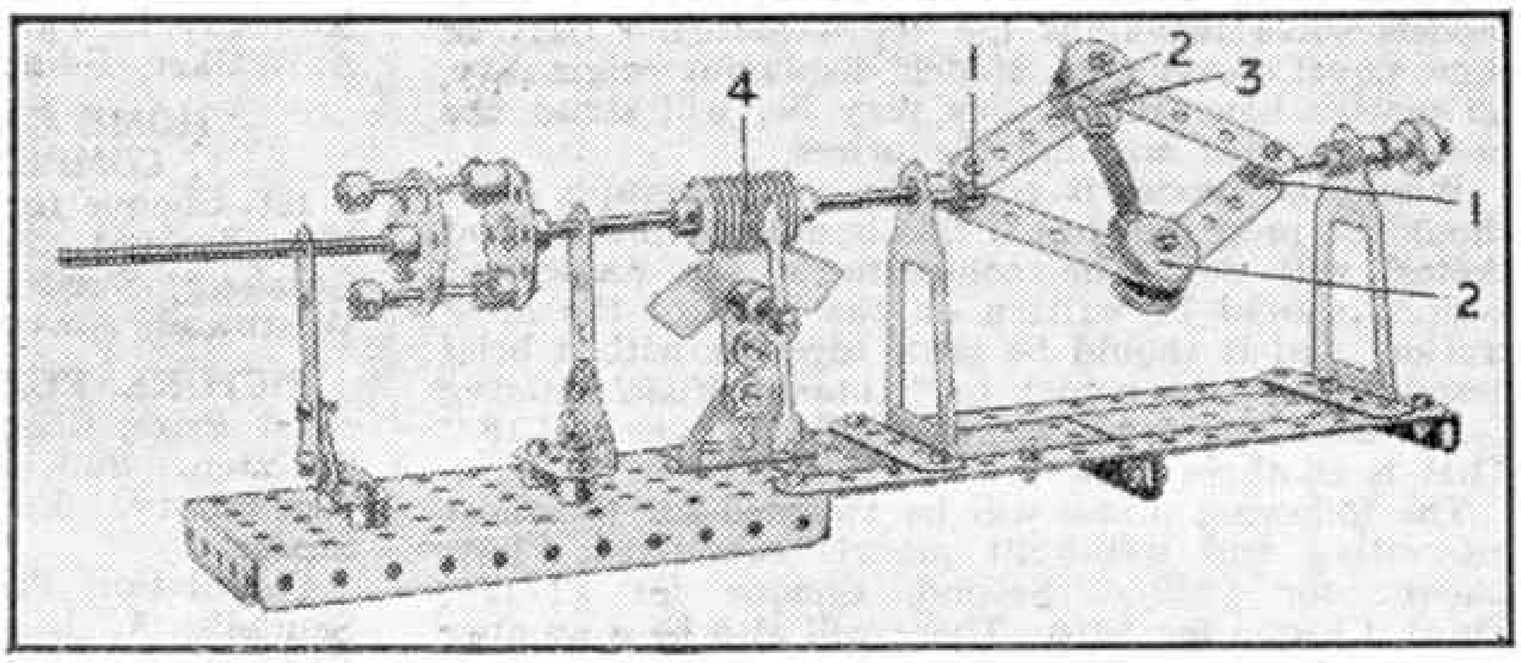


Fig. 2. A novel disc gear is used in this interesting speed indicator.

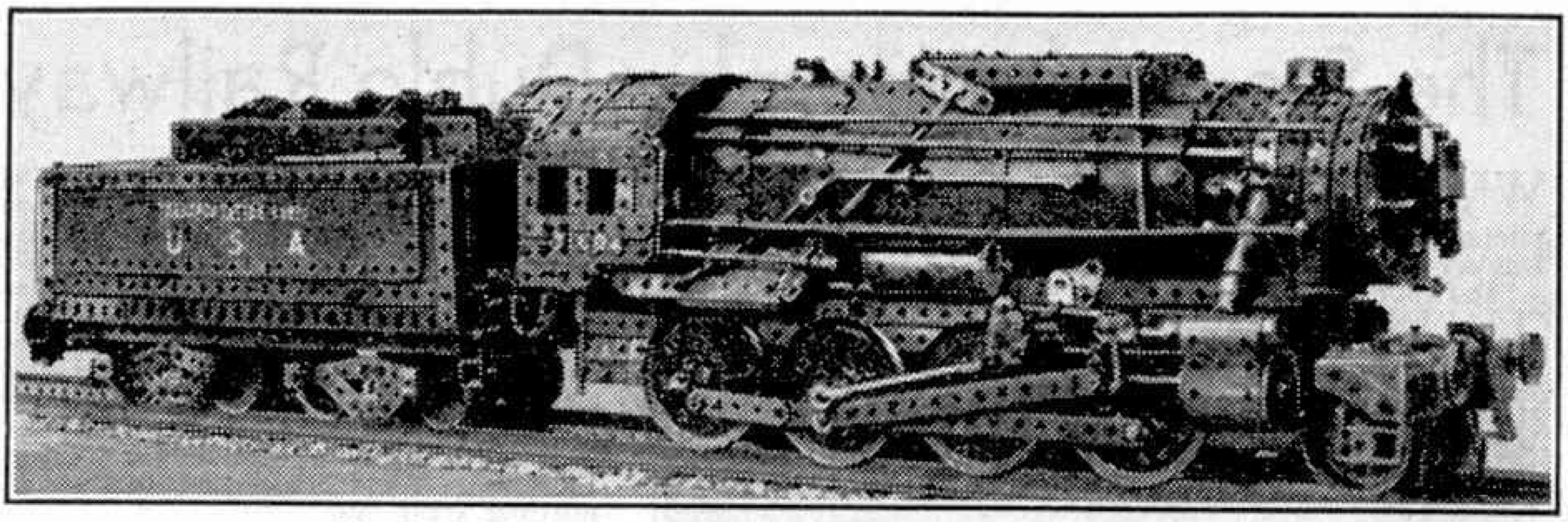


Fig. 3. J. E. Meggitt's American type "Austerity" locomotive.

It was built by J. E. Meggitt, Ipswich, who submitted it for the April Model-Building Competition, in which it was successful in winning Second Prize. The model is a fine example of careful planning, and the builder has given considerable attention to reproducing many of the smaller details, the inclusion of which gives the model a most realistic appearance. It is also a good example of Meccano parts used to the best advantage.

A DIFFERENTIAL FOR THE SMALL CAR

Differential gears are always interesting to model-builders accustomed to experimenting with the more complicated mechanisms, and because of this some of the many different types of differentials that it is possible to assemble from Meccano parts have been dealt with very fully in past issues of the Magazine. Recently I received a still further suggestion from R. J. Shephard, Old Colwyn, and his arrangement is shown in Fig. 4. A good feature of this is the few gears required, and the compact nature of the arrangement should make it very useful in models where space is limited. It consists of two 1½" Contrate Wheels and two ½" Pinions, which are mounted in a framework built from 1½" × ½" Double Angle Strips and 1½" Strips.

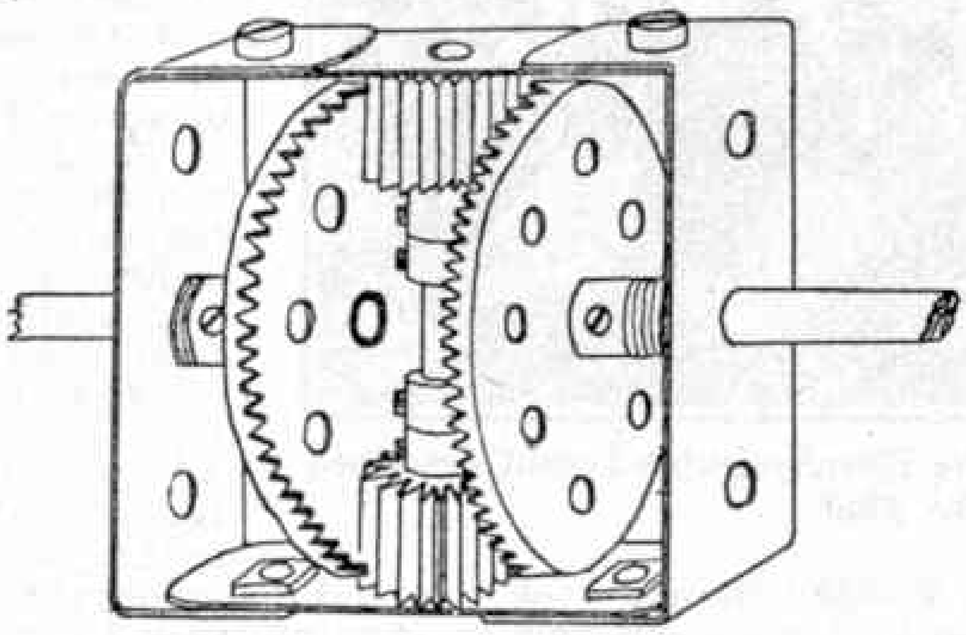


Fig. 4. Differential mechanism. An arrangement suggested by Mr. R. J. Shephard, Old Colwyn.

The drive to the cage can be arranged by bolting a 1½" diam. Bevel Gear to the side of the framework and meshing this with a ½" diam. Bevel on the driving shaft.

When the resistance on both of the road wheels is equal, the 1½" diam. Contrate Wheels revolve at the same speed; but when the resistance varies, as when the car is turning a corner, the speeds of the two Contrates are automatically adjusted as required by the radius of the turn.

"OFF THE BEATEN TRACK"

A novel model of a floating dock shown in Fig. 5 was built by P. Giese, Buenos Aires. It is built entirely from Meccano parts and is complete with a model tugboat constructed in scale with the general layout.

I am illustrating the model as an example of originality and to show the excellent results that can be obtained from comparatively simple constructions, provided that the subject chosen has individuality and "freshness." Many model-builders unfortunately get into a rut and seldom build anything but cranes, bridges and locomotives, although there are thousands of other equally interesting and more novel subjects awaiting their attention.

A MECCANOGRAPH SUGGESTION

Various schemes have been devised for tracing designs on Meccanographs, and one of these is to employ a blunt point to trace out the design on the upper side of carbon paper, which transfers the impression to a sheet of paper placed underneath it. L. S. Osborn (Dandenong, Victoria, Australia), uses an Axle Rod that has been filed down to a point. The method of mounting the Rod is worthy of note. A Crank is bolted to one end of a 3½" Strip and carries the Rod, the upper end of which is fitted with a 1" Gear that gives the point the requisite pressure for tracing the design. The Strip is pivoted on a Hinge bolted in the third hole from its other end, and at the end of the Strip are two Compression Springs that tend to press the point downward. The Hinge is bolted to an Angle Bracket on the writing arm. One of the Springs is held between the shanks of Bolts, and the other is on a ¾" Bolt.

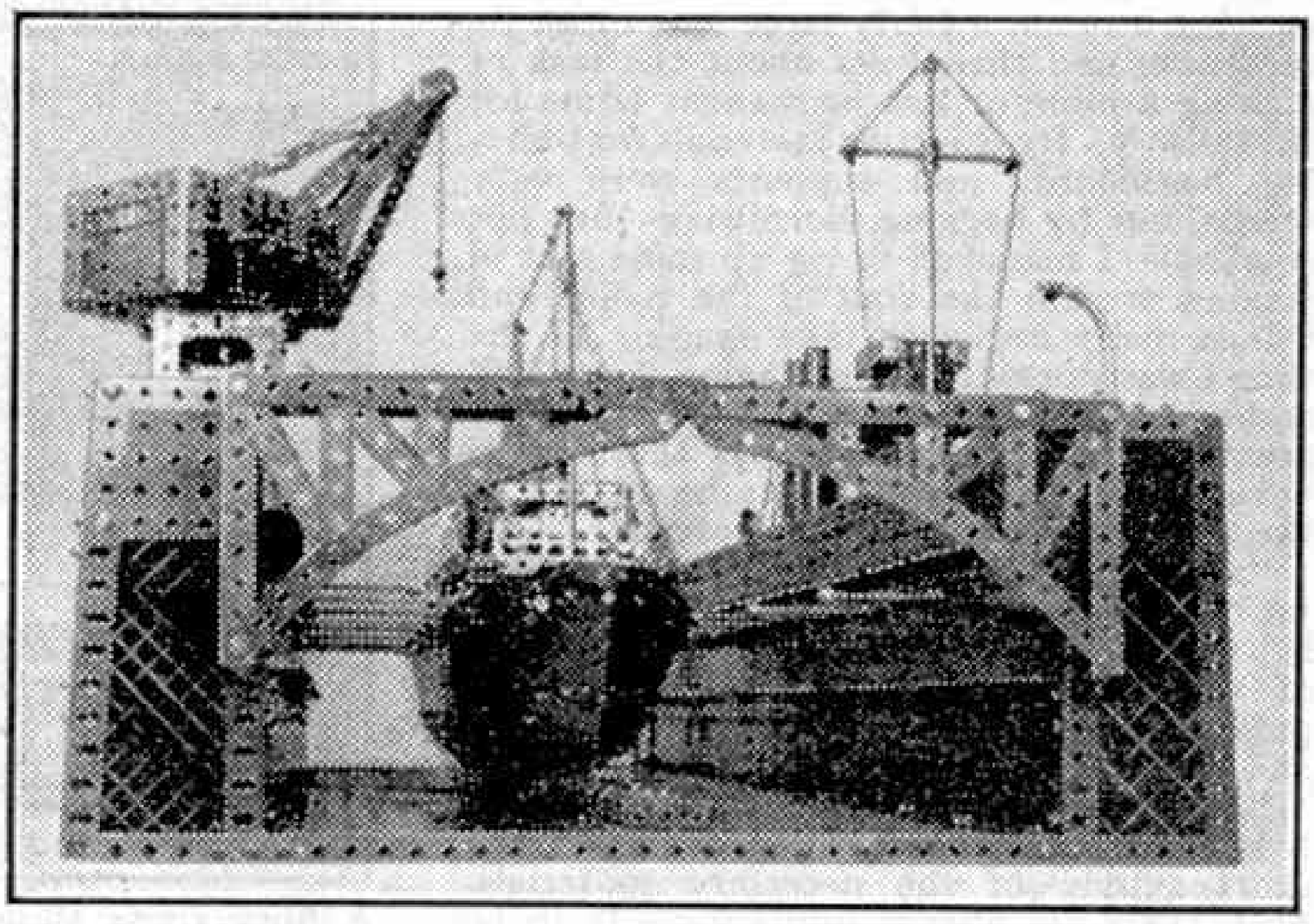
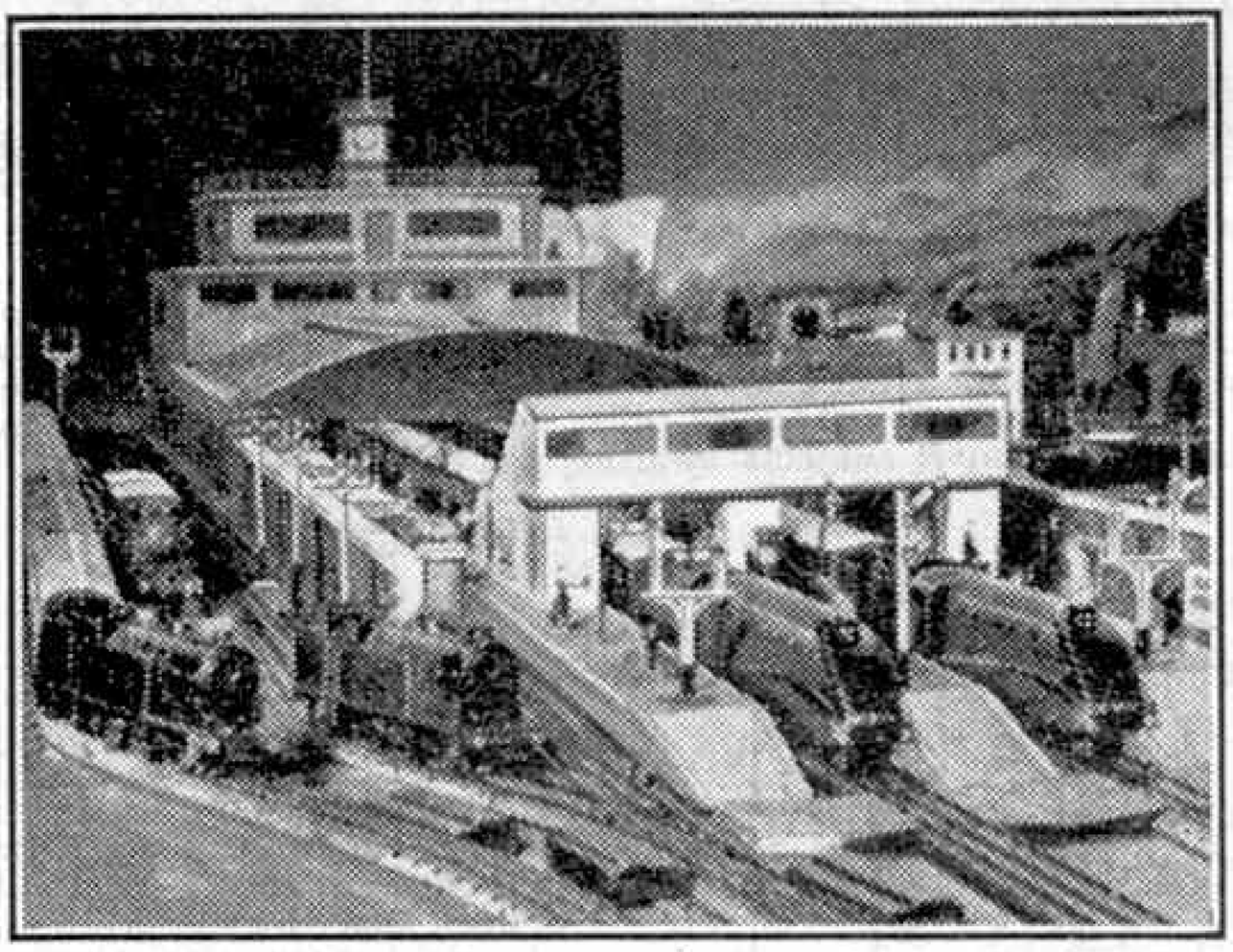


Fig. 5. "Off the Beaten Track." A novel subject for modelling excellently interpreted by P. Giese, Buenos Aires.

The Story of a Hornby-Dublo Railway

WE recently received from an "*M.M.*" reader, Mr. E. Dadstone, Surrey, the following entertaining account of the development of his Hornby-Dublo railway.

"It all started in January 1941," says Mr. Dadstone. "I had been visiting some friends at Christmas and while with them I came across a 1939 "*Hornby Book of Trains*," a most interesting book. I was completely thrilled with the Dublo equipment, and as soon as I returned home I set about the task of building up my own railway. I immediately ordered a goods train set. This duly arrived and it only whetted my appetite for more; but how was I to obtain it now that production was quite at an end? By devious methods, such as searching all likely stockists and by answering advertisements, I increased my stock until at last the 8 ft. by 4 ft. baseboard with which I started operations would no longer accommodate my railway.



The main through station on the Hornby-Dublo layout described on this page.

"Now came the most difficult problem; how could I extend the line? This I solved by clearing a room, a fairly large one, of all its furniture; and then I set about the task of making a more or less permanent home for the railway. By this time materials for building baseboards and supports were very scarce, but by begging, borrowing—but not stealing!—I managed to rig up some sort of staging around the wall of the room, and things really began to take shape. All the time I was working on the staging, I was still adding to my equipment. In fact one of the greatest joys of this hobby is that one is never finished; there seems to be no end to the improvements that can be made.

"As my stock grew, the accommodation for it had to grow proportionately, and that led me to knocking a hole through the wall of the room, taking the track along a passage, through a wall at the end of it, and so into another room.

"As far as track extensions are concerned a halt has had to be called owing to the short supply of the necessary materials. Still, there are always improvements to be made, and one gets a lot of real satisfaction in carrying these out.

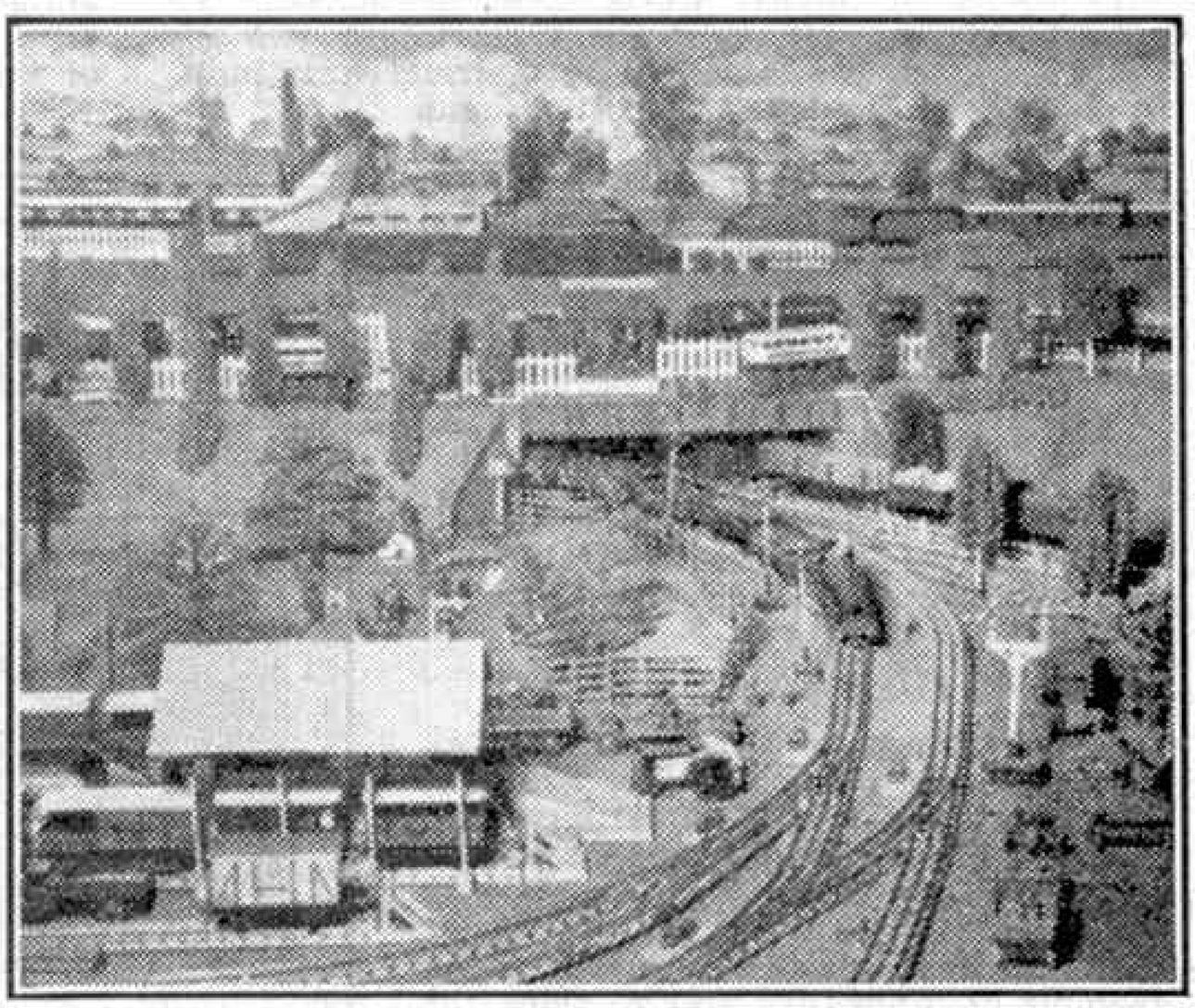
"With the rolling stock I have, I get plenty of fun in the running of the trains. The stock includes three Hornby-Dublo 4-6-2 streamliners, seven 0-6-2 tanks, 23 passenger and 70 goods vehicles of various kinds. These are in addition to about 40 Dinky Toys vehicles. The system is laid on two levels and is divided into five electric circuits, three on the high level and two on the low. By means of that clever device the Dublo Isolating Rail it is possible to run any train one wishes over the whole railway. Marshalling a train on the low level and bringing up to the high provides great fun.

"The trains at the moment are not run to a strict timetable, but the expresses of anything up to 10 vehicles, hauled by a 4-6-2 "*Sir Nigel Gresley*," running from the main room into the annexe, can be switched into the station at any moment according to platform accommodation. The station appears in the upper illustration. Throughout the system some 37 electrically controlled and 12 manual points are in use, while 41 Isolating Rails do their part in the operation of running this railway.

"Scenic effects have not been overlooked, and the whole of these, including stations, tunnels, buildings, cuttings and embankments, were made by myself during the long winter evenings between various war-time duties.

"Now let me confess that although I am now past my 60th year I still enjoy all the boyish enthusiasm of playing with trains; and the pleasure, far from diminishing with the advancing years, increases, and I look forward with a great amount of joy to the time when I can see the "*Duchess of Atholl*" with her train of L.M.S. coaches gracing my Dublo railway."

The illustrations give some idea of the elaborate nature of the line, and we are sure that readers will agree that this enthusiastic owner has built up a Dublo layout of considerable interest. We shall look forward to recording the further progress of the system in due course.



A busy scene showing main line and other tracks at various levels. The arrangement of the goods depot in the foreground and of the overbridge beyond is very effective.

Photography

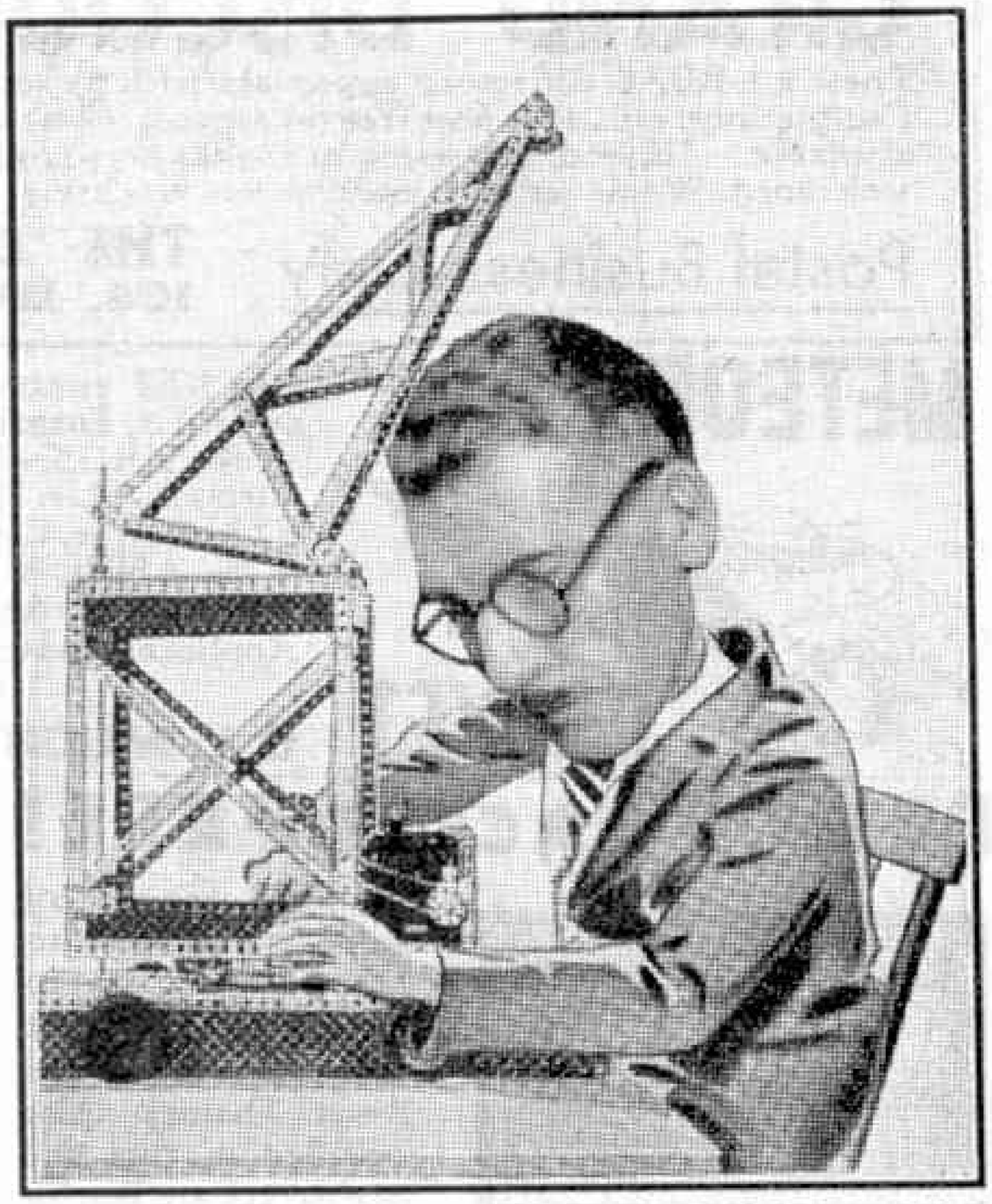
Amusing Caricatures of Your Friends

DURING the winter months the majority of amateur photographers confine their attention mainly to those branches of the hobby that can be carried on indoors, such as the making of pictures of the "table-top" type. Here we describe a simple method of making amusing caricatures that readers may like to try. Really funny results can be obtained as is shown by the accompanying illustrations.

First of all look through your prints for portraits of your friends, or small groups in which the heads are fairly large. Select your victims and then cut out their heads with sharp scissors. The cuts must be made cleanly.

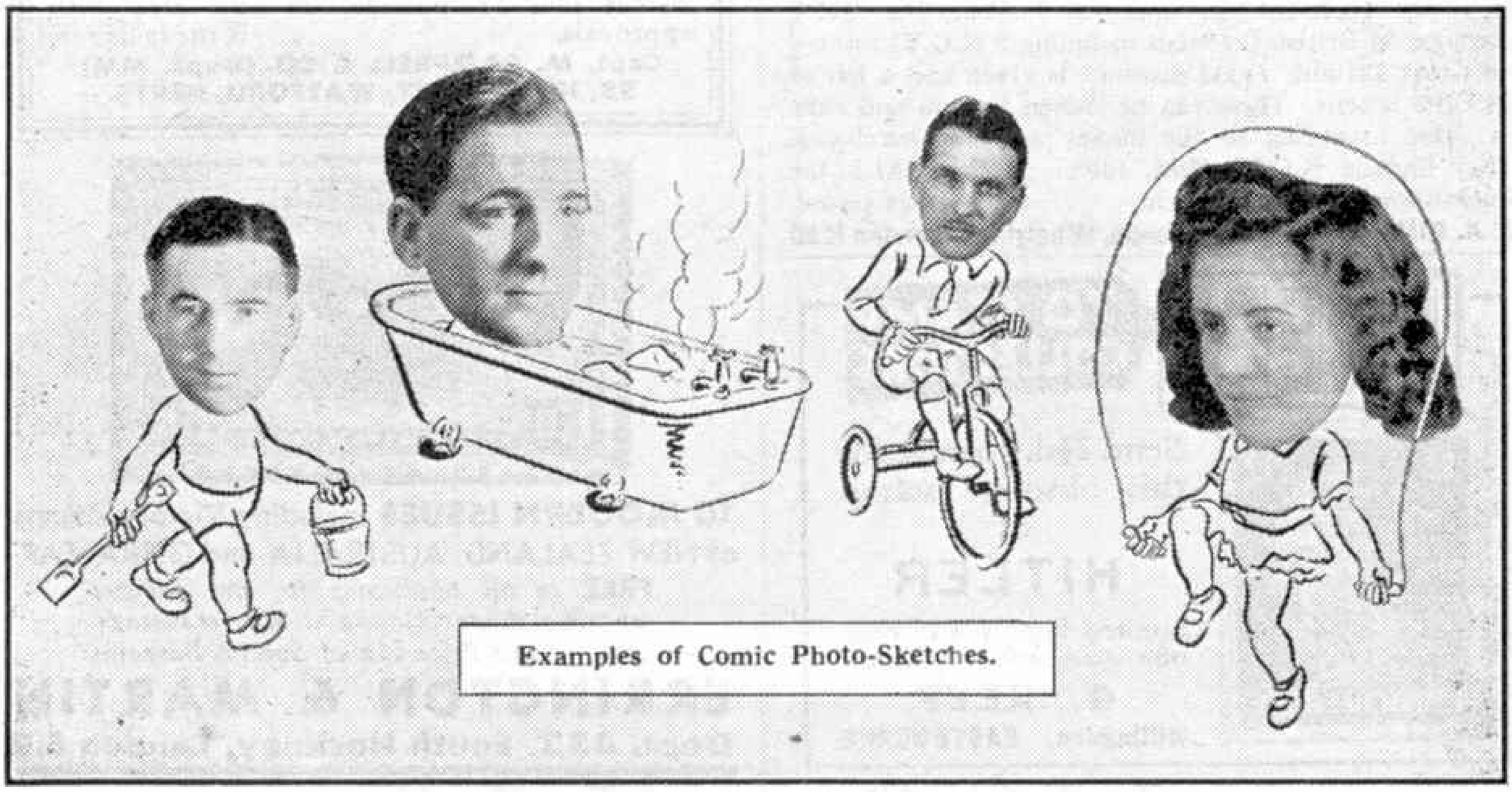
The next step is to provide each head with an amusing "body." This can be done in a variety of ways, but simple sketches are perhaps the most effective. These are not at all difficult to make, even for readers who have little artistic ability, as a few trials will show. Sketches of the special hobbies of your friends are easy to link up with their heads. But make sure in every case that there is nothing in your sketch that could possibly offend a friend or hurt his feelings.

It is best to make first a rough outline of the head and fit the preliminary sketch to this. Try the head at various angles



before making your final decision. Then paste the photographic head on to a piece of card or stout paper and add your finished sketch.

Readers who feel that suitable sketches of this kind are beyond their powers need not despair, as interesting and amusing effects can be got by means of ready-made figures such as can be cut from advertisements in magazines, etc. These should be trimmed up carefully so that when the photographed head is put in place it will fit readily into the general arrangement.



Examples of Comic Photo-Sketches.

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These are REAL collectors' approvals, with picked modern and new issues, obsolete and current G.VI, Coronations, etc., sent post free on request. General selections of Br. Colonials or Br. Cols. and Foreign available. 1d.—6d. per stamp or higher if required. Sets included. "Wants" lists for single stamps welcomed. We never send again unless you ask, so, for immediate and personal service, write NOW to

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FREE! Grand stamps commemorating that **"Hero of the South Seas," Capt. Cook** (1728–79), incl. fine **Cook Is.** (as reduced illus.), his **Sailing Ship** *Endeavour*, with **Chart,** also **'Landing of Capt. Cook,'** etc. Just send 2½d. postage for this grand romantic packet, and ask to see special "Mercury" Approvals.
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For other Stamp Advertisements see also pages 520 and vii.

Stamp Collecting

How to Display Stamps

By F. Riley, B.Sc.

LAST month I explained how beginners in the stamp collecting hobby should set about the task of obtaining stamps; the next step is to find just what is the best way of dealing with them. The first thing to bear in mind is that the stamps must be treated as something worth having and worth displaying. To leave them lying about in envelopes or in a cardboard box is not the best way of keeping them in condition, and stamps that are mishandled in this way soon become mere dirty bits of coloured paper. Actual handling should be avoided as far as possible. With a bit of practice stamp collectors soon get into the habit of lifting their stamps with tweezers, and this is definitely a very good habit to acquire, for continual touching, even with clean fingers, will eventually ruin the surface of a stamp.

For the actual display an album is essential. Most collectors should now find it possible to buy an album of some kind, and even if this is not entirely to their satisfaction it will serve for preserving and displaying their treasures until the day comes when albums are as varied and as plentiful as they were before the war. In fact, the good old days may yet return when stamps *and* albums are among the Christmas and birthday gifts that kindly parents and other relatives provide!

The album usually adopted by a beginner, or given to him, has one page devoted to each country, and covers the entire world of stamps. This is quite good for a start, although it has the disadvantage that the space available for certain countries becomes crowded, while the pages supposed to be filled with the stamps of others remain blank or are occupied by a solitary stamp or two. The latter difficulty can of course be overcome by one or other of the methods I described last month, but overcrowding is a more serious matter. Because of this difficulty the loose leaf album has been introduced and is strongly recommended, for extra sheets can be introduced at any point within it to accommodate additional stamps. The use of one of these albums also allows the collector to change his plans without undue disturbance.

There is one point that should be remembered. Placing stamps in an album makes it thicker, so one that has narrow strips of paper bound in between the leaves should be obtained, as this leaves room for the stamps themselves. No effort should be made to crowd a binding case with loose leaves. As a rule the number that a case can hold comfortably is provided by the maker of the album, and to try to cram in more leaves will only give a volume that is bulky and misshapen. The use of sheets of tissue paper for covering the stamps is to be recommended.

It is at this stage that the collector gives himself the pleasure of beginning to place his stamps on view in his album. There is little need nowadays to warn collectors not to lick the gummed side of the stamp and stick it down on the page, for even the veriest novice knows that this is wrong. The use of stamp edging is equally bad. It is often necessary to remove stamps from their positions in the album, and this can only be done with safety, to stamp and album alike, when good stamp hinges are employed, for these can be "peeled" off, that is they can be detached by a slow steady pull. Do not be tempted to buy cheap stamp hinges, for these will not peel easily, and stamps mounted with them have to be literally torn from their places, when changes are made, with the result that the surface of the album page is damaged.

Mounting a stamp correctly is an art that can readily be acquired with very little practice. The first step is to double over the stamp hinge, with the gummed or sticky side outward, making one arm about twice as long as the other. Then damp slightly a spot on the shorter arm—it is not necessary, and is indeed wrong, to wet it all over—and attach this to the back of the stamp, placing it straight in the middle, with the fold just below the top line of perforations. Finally damp the end of the larger arm of the hinge and place the stamp in its proper position in the album, gently pressing down to make sure that the hinge adheres to the page. A sheet of tissue paper should be laid on the face of the stamp before any pressure is exerted.

It is a good idea to practise this simple operation while holding the stamp with tweezers. The beginner may feel a little awkward at first, but he will soon pick up the knack. This is not a piece of fussy advice. The stamps with which he begins may not perhaps be valuable, or in particularly fine condition, but he hopes to have stamps of this kind eventually, and it is as well to follow good methods from the start, so that they become automatic.

A stamp mounted in the way described can easily be raised on the hinge so that the back can be examined, say when it is necessary to scrutinise the watermark. If by any chance a stamp is mounted in the wrong place, or if the best efforts of the beginner have not prevented one from being put in the album askew, it should be left there until another day. Removing it while the gum on the hinge is wet is certain to damage the album page, whereas good hinges peel readily and without mishap when the gum is dry.

Pairs are best mounted with a single hinge in the middle, as if they formed a single long stamp. Those who collect blocks of four should place the hinge just above the centre of the block, as this lessens risk of creasing.

PEACE STAMP FREE!

You can get from us **ABSOLUTELY FREE** the lovely new issue **Peace Commemorative** stamp of **GIBRALTAR,** which shows the **Houses of Parliament,** London, and the **River Thames.** This attractive and historic stamp is dated 8th June, 1946, which was Victory Day. Same design as illustrated. This stamp is going to be valuable. Get it **now** while you can; it is obtainable from us **ABSOLUTELY FREE.** Just ask for the **Gibraltar** Peace Stamp **Free,** and an approval selection, while 3d. in stamps must also be sent for postage.

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Austria ..	75	120	Malta	18	32
Belgium ..	65	110	Newfoundland	18	28
Canada ..	36	60	New Zealand ..	40	60
Ceylon	35	50	Norway ..	40	60
China	25	50	Palestine ..	30	45
Czecho-Slovakia	35	60	Poland ..	40	60
Denmark ..	75	120	Siam	25	40
Egypt	35	60	South Africa ..	35	50
France	60	100	Straits Setts. ..	24	35
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Complete 49 Sets PEACE Crown Colonials and States (100 stamps) and SPECIAL PRESENTATION VICTORY AND PEACE COMMEMORATIVE STAMP ALBUM 10"x8"—exact stamp size spaces and values above—coloured card covers for the entire 168 stamp collection, 27/6 only (or 5—5/- stamp lots and 3/- extra postages). Only readers who booked orders from past advertisements can obtain the Album for 2/6.

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PRE-EMINENT for the finest group of stamps in the philatelic world . . . . . **KG VI ISSUES** and a copy of our price-list will prove it.

A specimen copy costs a penny stamp, or 2/- for a year's supply.

N.Z. VICTORY STAMPS

A fine unused set of New Zealand Victory stamps showing Lake Mathieson, King Geo. VI and Parliament, and St. Paul's Cathedral with the Union Jack in the background, a quotation from one of Mr. Churchill's great Battle of Britain speeches, and the V sign, designs truly symbolising the sources of Peace, Strength, and Victory, sent free to all applicants for approvals enclosing 2½d. postage.

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EGYPT, 1946 30m. Aviation Congress ..	1/2	1/2
N. ZEALAND, 2½d. Mt. Cook, S.G.560 ..	—	6d.
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SUPERB APPROVALS (general, or by countries for really serious collectors and specialists) against approved English references or a deposit.

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21, AUCKLAND ROAD, NORWOOD, LONDON S.E.19
(Recently of SOMERCOTES, DERBY, but now returned to pre-war London address)

For other Stamp Advertisements see also pages 518 and vii.

Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

IT was thought, by dealers at least, that the prohibition of bartering with mint colonial stamps would bring about a shortage of foreign new issues, but up to the present it does not seem to have made much difference. Prices are perhaps a bit harder, but nothing like so high as they were before bartering was first allowed, and collectors who were afraid that they would have to do without their favourites are finding their fears groundless. May it so continue.

Some time ago the Belgian postal authorities were stated to be stopping the export of numerous special stamps, but still they come, and the air stamp which we are illustrating is one of the latest from that prolific country. Uncle Sam of course is still at it. Ever pleased for an excuse, he has emitted a new air stamp of 5 c. to fit the recently reduced air rate on domestic air mail. This stamp, red in colour, is well worth careful examination, for not only is the design very attractive, but technically it is a fine piece of recess printing. How lucky American collectors are, for their Post Office goes out of its way to supply well centred copies.

Many collectors who have spent a bit more on their hobby than they could afford during the war have been rather afraid that prices might slump. But in the new season's auctions prices seem higher than ever, so if there is to be a slump, it is most certainly not here yet. Speaking of auctions, the general public has no idea just how much money is spent on stamps. One London auction firm alone last season sold over a quarter of a million pound's worth of stamps.

As most collectors know, the catalogue most in use in the U.S.A., their "*Gibbons*" as it were, is Scotts. This is a big pretentious volume more imposing in size than contents, and latterly there has been a lot of grumbling over its pricing. Recently American collectors received a shock, for they got the news that it had been purchased by Mr. Gordon Harmer, the head of Messrs. Harmer, Rooke and Co., the famous London firm of stamp auctioneers. The new owner should not find it very hard to improve the American philatelic bible.

Mr. E. A. Smythies, until lately Editor of the "*Philatelic Journal of India*," has written a very interesting article, recently, on "*Whither Philately*." He retells that old, old but ever fresh story about the huge sack of Cape of Good Hope "triangles" bought by the late Stanley Gibbons for a fiver from a sailor, and how 20 years after the purchase that pioneer of stamp dealers was still selling from the sack, with hundreds of pounds already in hand as profit. There are any number of dealers today on the lookout for deals such as that, but though there are apparently no sacks about, the writer was once shown in a drawer in a businessman's desk old Argentina and Uruguay covers, which must easily have been worth a couple of thousand pounds. Alas, the owner knew their value to the last cent!

All this talk of the huge sums involved in the buying and selling of stamps may be rather disconcerting to the modest collector, who only has a shilling or two a month to spend on his hobby. But there is no need for this, for there is room for everybody under the banner of philately. An interesting collection of stamps was recently shown at a stamp society's meeting, and one of the members, with a collection worth many hundreds of pounds, was heard to say when it was all over that the display was the most interesting he had seen for years. Actually the selling value of those stamps was less than £2, but the owner had not only taken pains to learn all about his stamps, but also to mount them attractively.

This mounting attractively is well worth consideration. Unfortunately, few collectors take the trouble, and more collections are spoiled by slovenly mounting than anything else. To junior collectors, one word of advice is worth consideration. Learn to mount your stamps decently, don't mount damaged copies, and keep your album clean. If these points are ignored, don't be surprised if dealers refuse to buy your collection, if you ever want to sell.

A country which brings out well-designed and attractive stamps is Finland, and we are illustrating one of the latest commemoratives, which can be obtained for a few coppers. Stamps of this country are quite easy to obtain and collectors interested in a new field could do worse than take up Finland.

Another popular and "easy-to-collect" country is Holland, and for our next illustration this month we are showing one of the six childrens' welfare stamps recently issued. In this set the three daughters of Holland's Crown Princess are depicted. We illustrate also the Mitchell centenary stamp from Australia, referred to last month.

Anybody needinga Crown Colony "Victory" set should buy it now. We are making this set our tip of the month.

Footplate Trip on the "Turbomotive"—

(*Continued from page 490*)

over to a shed engineman, so gathering up coats, baskets and bottles we dismounted and booked in our arrival. Robinson handed in his shovel at the stores while both enginemen went to book off duty, but not before Driver Worman had completed his "Driver's Statement," a comprehensive report covering the details of the run, and a separate ticket detailing any attention necessary to the engine before its next trip. Both men would find out also the time they were required to book on for their next turn of duty.

By special permission of the L.M.S. authorities I was allowed to spend the night at the Enginemens' Hostel, an institution that is a great benefit to crews working into Euston on "lodging turns" when they are required to spend the night away from home. It was no less a boon to me, for I avoided the inconvenience that would have been occasioned by having to find suitable quarters. I drew a "lodging ticket" at the Shed Office, and a friendly guide, "*Fred*" by name, took me across from the shed to the Hostel situated on the opposite side of the line. Here I was made welcome and comfortable, and after a much-needed and appreciated bath I took over the cubicle assigned to me, having made arrangements for calling up the following morning; and so to bed.

Puzzle Your Sharp-Eyed Friends—

(*Continued from page 498*)

pocket inside out to show that the ribbon has gone. The other method to which I have referred calls for a piece of elastic, a safety pin tied to one end, and a small curtain ring tied to the other. Fasten the pin to your trousers at the back, then put another safety pin just above your right hip. leading the elastic through it. The elastic should be just very slightly stretched with the curtain ring drawn gently against this second pin.

To operate the vanish, turn to your right and pick up the ribbon with your left hand. This covers your right hand, which secures the ring and draws it forward from under your coat, stretching the elastic. Now loop up the ribbon, tucking it through the ring as you do so and making it into a number of short loops. Make a throwing movement into the air and—this is very important—follow with your eyes the imaginary flight of the ribbon to the ceiling. At the same time release the elastic, and the ribbon will be whisked away under your coat and out of sight. This will need a few trials to get it perfect, but it is not difficult, and when neatly done the effect is quite astonishing. All you have now to do is to open the matchbox, take out the ribbon and spread it out.

This brings you to the end of your show and me to the end of my article. I hope you have enjoyed it. Good luck with your performance!

Ship Repair and Salvage—(*Continued from page 508*)

alignment. Then the tanks and bilges were heavily ballasted to make sure that the section would not float off the blocks when the dock was flooded to bring in the forward half. In due course the bow half was hauled in, stem first, so that its rags would not foul the blocks. The dock was emptied and the torn metal burned away, after which the dock was once again flooded. The bow half was towed out into the bay, turned round, and brought back into the dock broken end first, thus having the vessel's bow and stern in correct relative positions.

After all damaged material had been removed, the hull structure between bulkheads, including shell, deck, longitudinal bulkheads and strength members comprising No. 7 tank was erected in place. The new section connected the forward and after sections, and upon the completion of the welding the tanker was once more a whole ship and ready to go back to service.

Plastics in Everyday Life—(*Continued from page 505*)

of 3,000 lb. per sq. in. it can easily be seen what enormous pressures would be required to mould large parts. For example a sheet 24 in. square would require some two million lb. pressure from the press, which is obviously impracticable, unless huge quantities are required of high value to the consumer, to balance the cost of the special presses. The largest known mouldings produced so far have been for the manufacture of coffins under a moderately low pressure.

A long list of parts could be given of the plastic components used in the manufacture of cars, motorcycles and bicycles. Many of the tools used by craftsmen in workshops and factories are equipped with handles insulated by plastics, such as screwdrivers, electric drills, cutters, etc. During the war firemen were equipped with axes the handles of which were sheathed with a plastic resisting thousands of volts. In the kitchen too we find many of the utensils with plastic handles—such as kettles, jugs, teapots, knives and forks. The ash-tray, ornaments, electric fans, saucepans, bowls, door knobs and handles, push plates, letterboxes and countless other parts performing quiet duties will be found to be moulded in plastics. Gas cookers and other heating appliances have plastic handles and controls of various types. In offices we may see plastics in filing cabinets, typewriter parts, adding and calculating machine parts, trays, chair backs, picture frames, containers, etc.

Through all the various branches of our activities we now become aware of the silent infiltration of plastic materials into our everyday lives. The parts made of plastics may seem to be small and unimportant, but in many cases the duties performed are vital; and it may be that with scientific progress and the aid of our research chemist we are moving into a Plastic Age.

A Modern Whale Factory Ship—(*Cont. from page 487*)

re-heat type developing a total of about 8,000 I.H.P., using superheated steam at 220 lb. per sq. in. pressure. All the usual auxiliaries are fitted.

Steam is supplied by seven single-ended multitubular Scotch boilers fitted with combustion chamber superheaters, and arranged for burning oil fuel under forced draught. The exhaust gases are led up two funnels which are placed one at each side of the ship so that the whale slipway can pass between them.

The vessel is fitted with the most up-to-date devices, including gyro-compass, short and long wave wireless, two systems of wireless telephony, direction finder, echo sounder, automatic fog signal, rudder indicator, electric log and, last but not least, two systems of Radar.

The latest news received from the "*Balaena*" is that she is nearing her fishing area and has had a very successful passage out, via South Africa, to the Antarctic.

BINDING THE "M.M."

Owing to rises in costs O. H. Bateman and Co. Ltd. have found it necessary to increase their charges for binding the "*M.M.*" from 10/6 to 12/6 per volume. The charge for the binding case when supplied separately is increased from 6/6 to 7/6.

Readers of the Magazine who wish to have their copies bound in volume form should send them direct to this firm at 23, Hanover Street, Liverpool 1, with a postal order for the amount required, stating in the accompanying letter whether they wish the covers to be included or not. All orders are acknowledged.

THE NATIONAL MODEL AIRCRAFT EXHIBITION

This Exhibition, the third of the series, will be held at Dorland Hall, Lower Regent Street, London S.W.1, from 12th December 1946 to 11th January 1947. It will be open daily from 10.30 a.m. to 7.0 p.m.

The exhibits will include winning entries in the 12 Area Senior and Junior contests in the nation-wide model aircraft building competition announced on page 436 of the October "*M.M.*"

Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

Advertisement Jig-Saw Puzzle

In our chief competition this month readers are asked to identify the fragments, cut from advertisements in this issue, that make up the jig-saw here reproduced. Some of the bits will be easy to trace; others may prove teasers, but we have little real hope of baffling our lynx-eyed readers.

In their solutions competitors are asked to give the names of the advertisers represented in the jig-saw, together with the page numbers of the advertisements from which the fragments have been taken. When a competitor has identified each bit, his list of names and page numbers must be sent to *"December Jig-Saw Contest, Meccano Magazine, Binns Road, Liverpool 13."*

As usual there will be two sections in this contest, for Home and Overseas readers respectively, and in each there will be prizes of 21/–, 15/– and 10/6 for the best entries in order of merit, with consolation prizes for other good efforts. Neatness and novelty will be taken into account if there is a tie for any prize.

Closing dates: Home Section, 31st January 1947; Overseas, 31st July 1947.

"Do You Know - - - ?"

"Quiz" competitions are very popular nowadays, so here are a few railway questions. Some of these are fairly easy. Others are not so simple, but providing the answers will give competitors something to think about in between the festivities of the Christmas season.

Here are the questions, 14 in number:

1. **Where are the world's most frequent steam services operated?**
2. **Which is the only overhead railway in Britain?**
3. **Where is the world's largest covered goods station?**
4. **What is a "War Well"?**
5. **What is meant by Standard Gauge?**
6. **Which is the world's greatest railway centre?**
7. **What is the type name for the 2-8-2 locomotive?**
8. **What is meant by "The signal is on"?**
9. **What is a block freight train?**
10. **What is a compound locomotive?**
11. **Which was the first electrified underground railway in Britain, other than a "Tube"?**
12. **What is a train set?**
13. **On signal semaphore arms crosses are sometimes seen; what is the meaning of these?**
14. **What is the meaning of a zig-zag or wavy sign that appears on a large indicator board found in certain places at the lineside?**

As usual there will be two sections, for Home and Overseas readers respectively, and in each there will be prizes of 21/–, 15/– and 10/6 for the best entries in order of merit, with consolation prizes for other deserving efforts. Ties will be decided on neatness and originality.

Entries must be addressed *"December Railway Quiz Contest, Meccano Magazine, Binns Road, Liverpool 13,"* and must be posted to reach this office on or before 31st December. Overseas closing date, 31st July 1947.

December Photographic Contest

This month's photographic contest is the 12th of our 1946 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1. that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: *"December Photographic Contest, Meccano Magazine, Binns Road, Liverpool* 13." There will be separate sections for Overseas readers, and in each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 31st December; Overseas Section, 30th June 1947.

Fireside Fun

"Yes, my son has taken up French, Italian, Spanish and Dutch."

"Good gracious. He must be clever. Where does he study?"

"He doesn't study. He's the lift boy at the Grand Palace Hotel."

* * * *

"I distinctly told those two boys of mine not to go out cycling today, but they're just crazy on it, and out they've gone."

"Tandem?"

"No. but just wait till they get back home again."

* * * *

"Morning, doctor. You look glum. Is something wrong?"

"Rather. I've just sent my richest patient the wrong medicine."

"Oh, dear. Will it do him any harm?"

"Any harm? No, it'll cure him in a day or so!"

* * * *

"Did your father promise you something if you tidied up the garden for him?"

"Oh, no. But he promised me something if I didn't."

* * * *

"Do stop whistling that tune over and over again, Tommy."

"But I have to do it over and over again. There are 20 verses in it."

* * * *

"I'se hurted myself."

"Well don't cry, dear."

"What's crying for, then?"

* * * *

"Why is the church bell better than the organ?"

"I don't know. Why?"

"Well, the bell answers when it is tolled, but the organ says 'I'll be blowed' before it makes a noise."

* * * *

Teacher: "Johnny, what is the difference between the North Pole and the South Pole?"

Johnny: "I don't know exactly, Miss, but I know there is a world of difference."

* * * *

THIS MONTH'S HOWLER

Eskimos are very woolly persons.

"Move farther up the bus, please!"

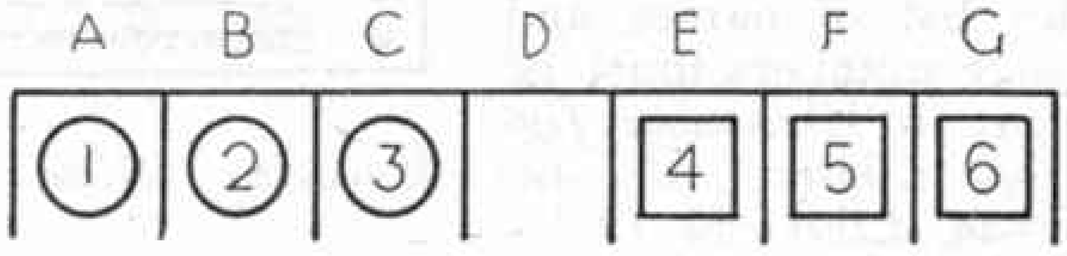
"It's not father; it's grandad."

* * * *

BRAIN TEASERS
TRY THIS OUT

In the accompanying diagram are shown three round counters, numbered 1, 2 and 3, and three square ones, numbered 4, 5 and 6. What is the least number of moves in which these counters may be made to change places, 1 with 4, 2 with 5 and 3 with 6? A square must be empty if a counter is to be moved into it, and the only moves allowable are either into the next compartment, or into the next but one. Round counters can be moved only to the right, and square counters only to the left.

There may be readers who can solve this puzzle mentally, but I think most of them will do well to cut out counters of the required shape from cardboard, and to make experiments.



* * * *

EIGHT NUMBERS WANTED

Now we turn to a bit of simple arithmetic, not exactly of the school type. A sum of £AB–CD–E divided between eight people gave them £F–G–H each. What numbers do the eight letters in this stand for? Every figure from 1 to 9 appears in the sum.

S.W.C.

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

The key to the solution of our first puzzle last month is the note that the express is *slowly* overtaking the tube train. This means that the speeds were not too greatly different, that is the tube train produced five rail beats to every six of the express. Thus the speed of the tube train was 5/6ths of that of the express, which must have been running at 54 m.p.h., or 9 m.p.h. faster.

The code in our second puzzle can easily be seen to be the reversed alphabet, A being represented by the number 26 and Z by 1. The answer required therefore is BIRMINGHAM. Please do not write to tell me that there is no such team in the Football League. I know ! ! !

The missing letter in our third puzzle is S, and the sentence formed by introducing it 11 times is SLEEPLESSNESS IS A DISASTROUS DISEASE.

In our third puzzle the lines have to be drawn across the face of the clock to include between them the numbers 3 and 4 on the right and 9 and 10 on the left, giving a total of 26. It will then be found that the numbers above the upper line and those below the lower line also add up to 26.

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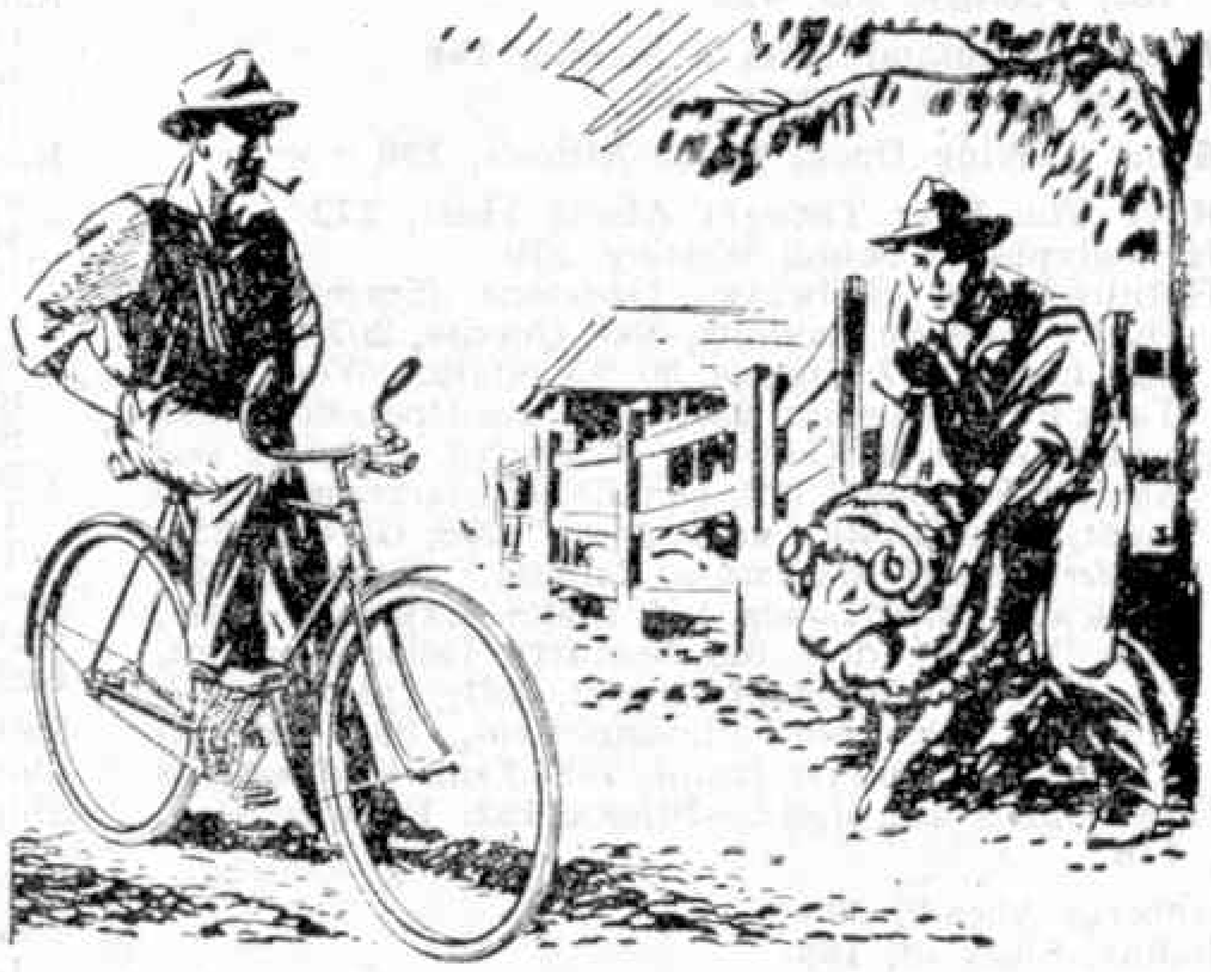

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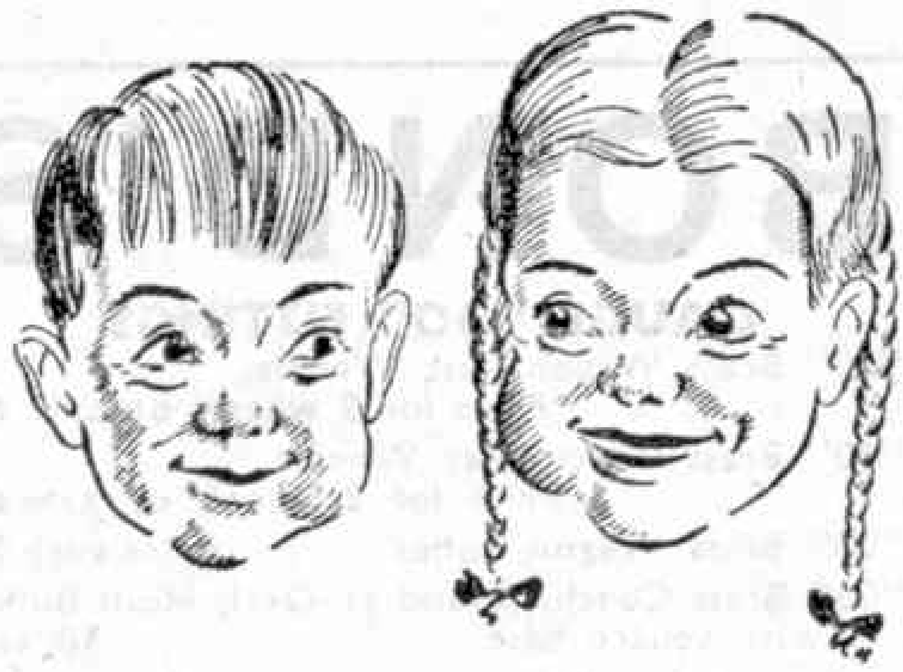

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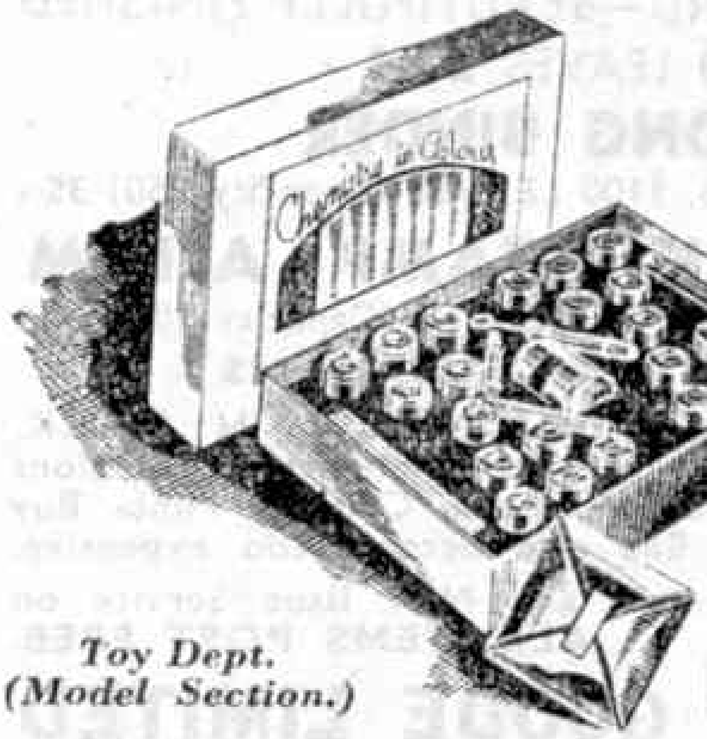

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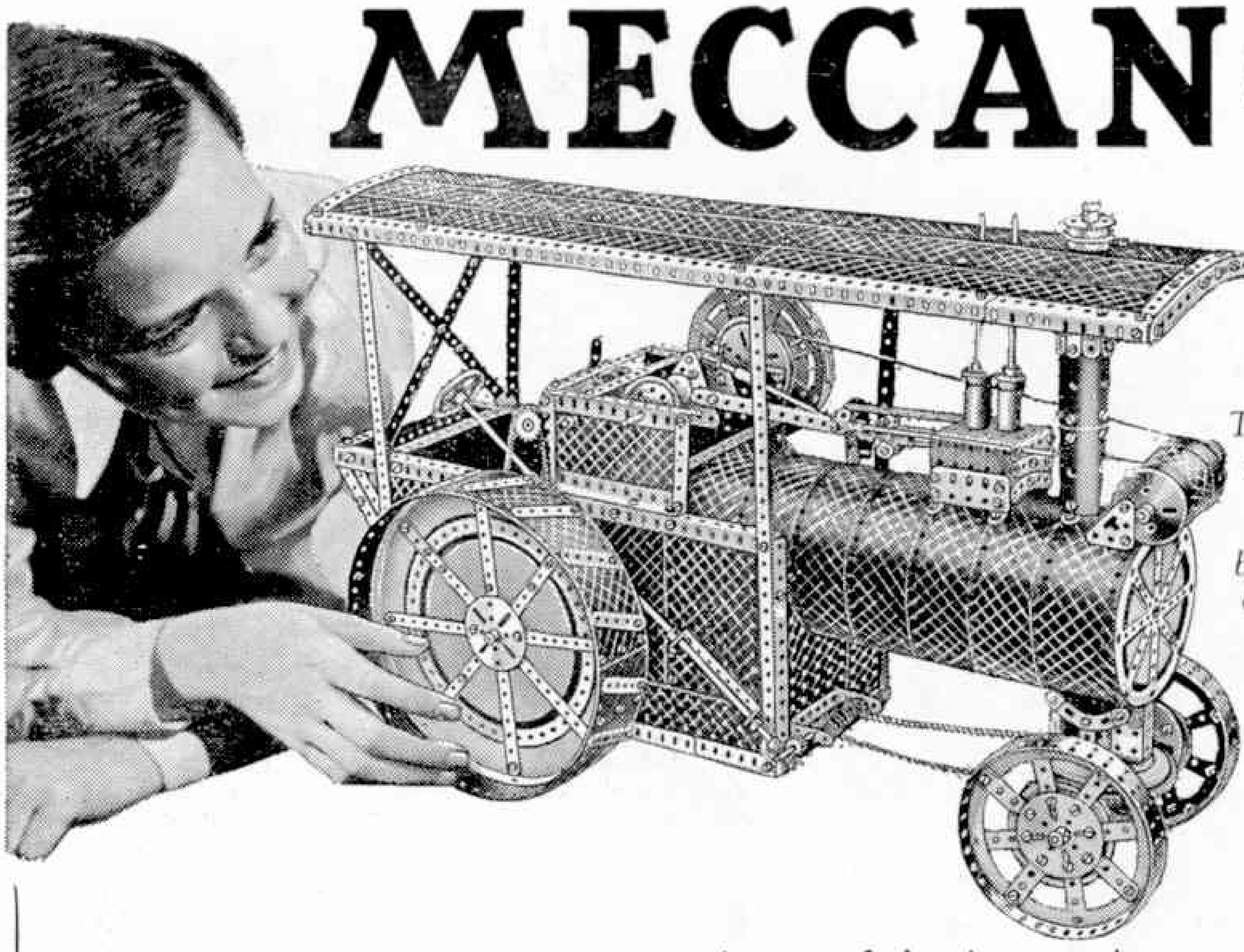

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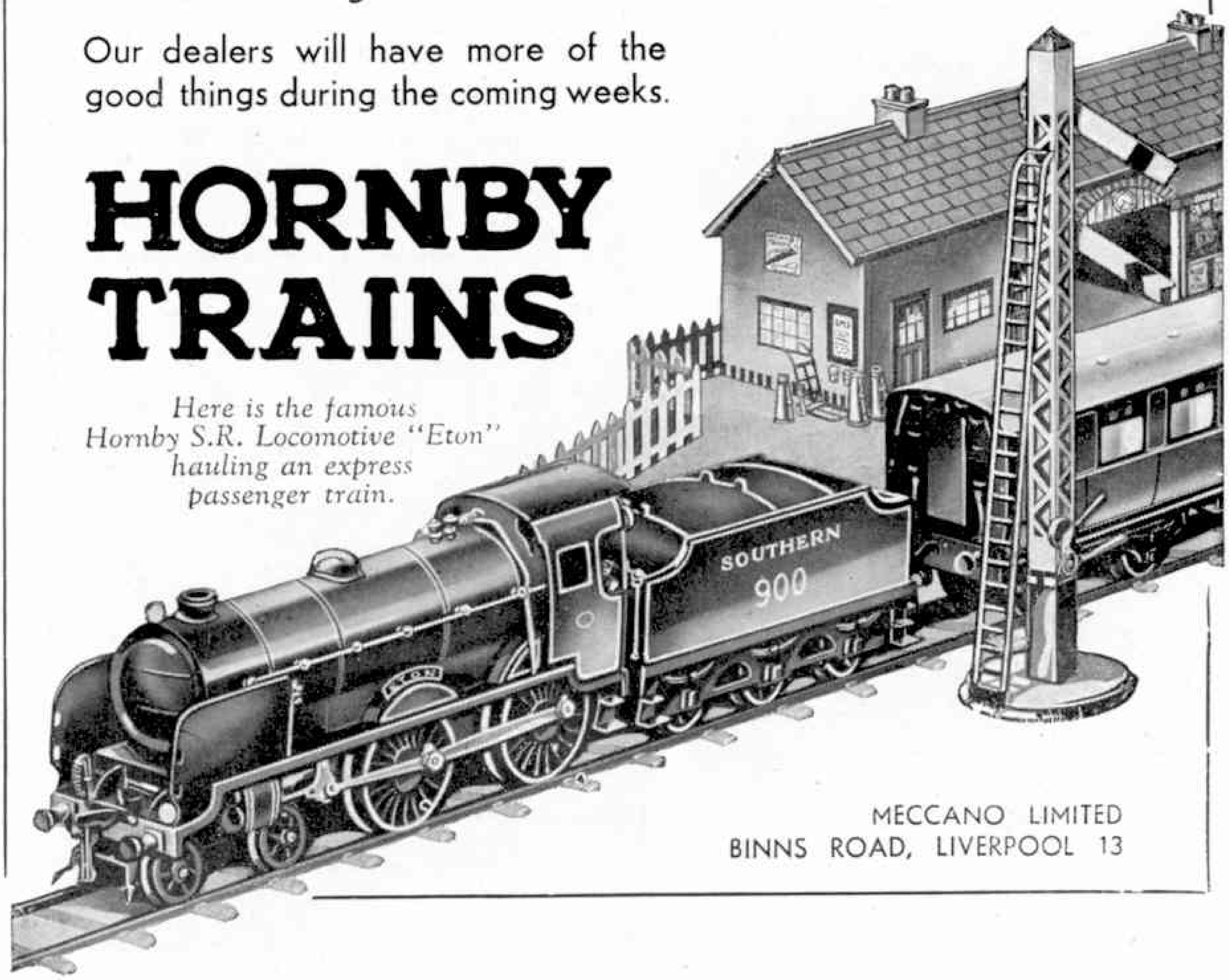

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